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The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861–1957[1]

By A. W. PHILLIPS

I. HYPOTHESIS

When the demand for a commodity or service is high relatively to the supply of it we expect the price to rise, the rate of rise being greater the greater the excess demand. Conversely when the demand is low relatively to the supply we expect the price to fall, the rate of fall being greater the greater the deficiency of demand. It seems plausible that this principle should operate as one of the factors determining the rate of change of money wage rates, which are the price of labour services. When the demand for labour is high and there are very few unemployed we should expect employers to bid wage rates up quite rapidly, each firm and each industry being continually tempted to offer a little above the prevailing rates to attract the most suitable labour from other firms and industries. On the other hand it appears that workers are reluctant to offer their services at less than the prevailing rates when the demand for labour is low and unemployment is high so that wage rates fall only very slowly. The relation between unemployment and the rate of change of wage rates is therefore likely to be highly non-linear.

It seems possible that a second factor influencing the rate of change of money wage rates might be the rate of change of the demand for labour, and so of unemployment. Thus in a year of rising business activity, with the demand for labour increasing and the percentage unemployment decreasing, employers will be bidding more vigorously for the services of labour than they would be in a year during which the average percentage unemployment was the same but the demand for labour was not increasing. Conversely in a year of falling business activity, with the demand for labour decreasing and the percentage unemployment increasing, employers will be less inclined to grant wage increases, and workers will be in a weaker position to press for them, than they would be in a year during which the average percentage unemployment was the same but the demand for labour was not decreasing.

A third factor which may affect the rate of change of money wage rates is the rate of change of retail prices, operating through cost of living adjustments in wage rates. It will be argued here, however, that cost of living adjustments will have little or no effect on the rate of change of money wage rates except at times when retail prices are

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[1] This study is part of a wider research project financed by a grant from the Ford Foundation. The writer was assisted by Mrs. Marjory Klonarides. Thanks are due to Professor E. H. Phelps Brown, Professor J. E. Meade and Dr. R. G. Lipsey for comments on an earlier draft.

forced up by a very rapid rise in import prices (or, on rare occasions in the United Kingdom, in the prices of home-produced agricultural products). For suppose that productivity is increasing steadily at the rate of, say, 2 per cent. per annum and that aggregate demand is increasing similarly so that unemployment is remaining constant at, say, 2 per cent. Assume that with this level of unemployment and without any cost of living adjustments wage rates rise by, say, 3 per cent. per annum as the result of employers' competitive bidding for labour and that import prices and the prices of other factor services are also rising by 3 per cent. per annum. Then retail prices will be rising on average at the rate of about 1 per cent. per annum (the rate of change of factor costs minus the rate of change of productivity). Under these conditions the introduction of cost of living adjustments in wage rates will have no effect, for employers will merely be giving under the name of cost of living adjustments part of the wage increases which they would in any case have given as a result of their competitive bidding for labour.

Assuming that the value of imports is one fifth of national income, it is only at times when the annual rate of change of import prices exceeds the rate at which wage rates would rise as a result of competitive bidding by employers by more than five times the rate of increase of productivity that cost of living adjustments become an operative factor in increasing the rate of change of money wage rates. Thus in the example given above a rate of increase of import prices of more than 13 per cent. per annum would more than offset the effects of rising productivity so that retail prices would rise by more than 3 per cent. per annum. Cost of living adjustments would then lead to a greater increase in wage rates than would have occurred as a result of employers' demand for labour and this would cause a further increase in retail prices, the rapid rise in import prices thus initiating a wage-price spiral which would continue until the rate of increase of import prices dropped significantly below the critical value of about 13 per cent. per annum.

The purpose of the present study is to see whether statistical evidence supports the hypothesis that the rate of change of money wage rates in the United Kingdom can be explained by the level of unemployment and the rate of change of unemployment, except in or immediately after those years in which there was a very rapid rise in import prices, and if so to form some quantitative estimate of the relation between unemployment and the rate of change of money wage rates. The periods 1861-1913, 1913-1948 and 1948-1957 will be considered separately.

II. 1861-1913

Schlote's index of the average price of imports[1] shows an increase of 12·5 per cent. in import prices in 1862 as compared with the previous

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[1] W. Schlote, *British Overseas Trade from 1700 to the 1930's*, Table 26.

year, an increase of 7·6 per cent. in 1900 and in 1910, and an increase of 7·0 per cent. in 1872. In no other year between 1861 and 1913 was there an increase in import prices of as much as 5 per cent. If the hypothesis stated above is correct the rise in import prices in 1862 may just have been sufficient to start up a mild wage-price spiral, but in the remainder of the period changes in import prices will have had little or no effect on the rate of change of wage rates.

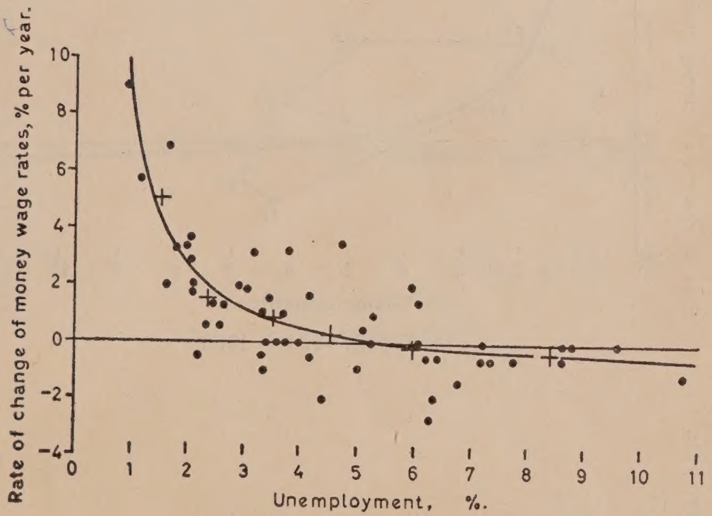

Fig.1. 1861 – 1913

A scatter diagram of the rate of change of wage rates and the percentage unemployment for the years 1861-1913 is shown in Figure 1. During this time there were 6½ fairly regular trade cycles with an average period of about 8 years. Scatter diagrams for the years of each trade cycle are shown in Figures 2 to 8. Each dot in the diagrams represents a year, the average rate of change of money wage rates during the year being given by the scale on the vertical axis and the average unemployment during the year by the scale on the horizontal axis. The rate of change of money wage rates was calculated from the index of hourly wage rates constructed by Phelps Brown and Sheila Hopkins,[1] by expressing the first central difference of the index for each year as a percentage of the index for the same year. Thus the rate of change for 1861 is taken to be half the difference between the index for 1862 and the index for 1860 expressed as a percentage of the index

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[1] E. H. Phelps Brown and Sheila Hopkins, " The Course of Wage Rates in Five Countries, 1860-1939," *Oxford Economic Papers*, June, 1950.

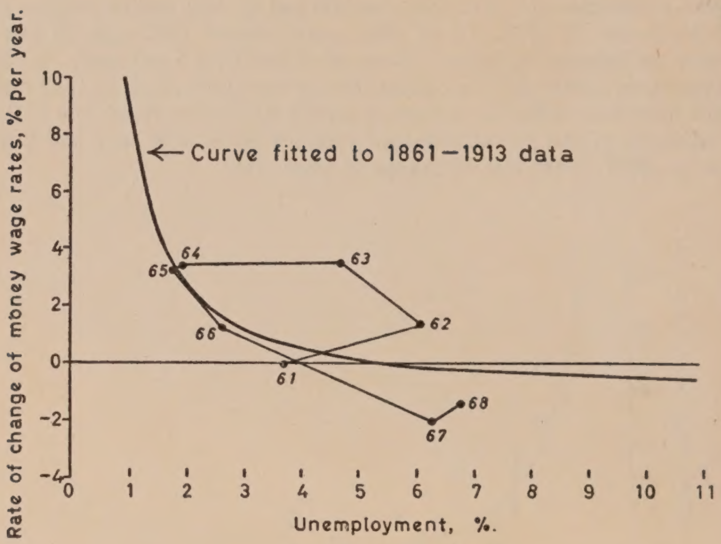

Fig. 2. 1861 — 1868

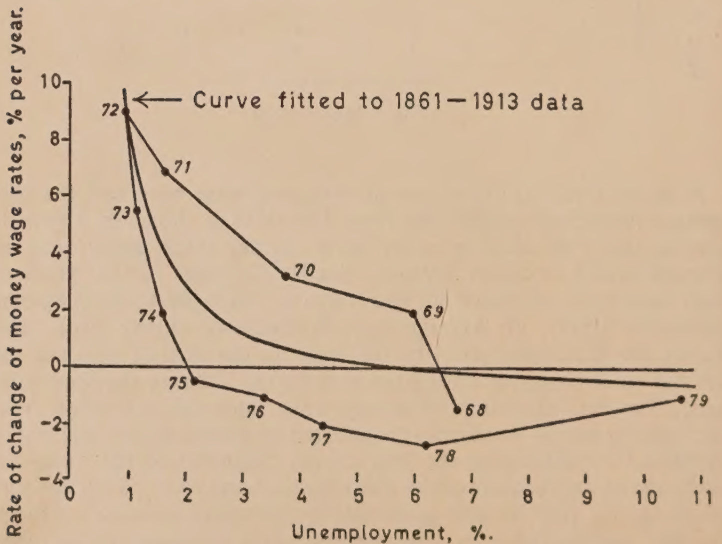

Fig. 3. 1868 —1879

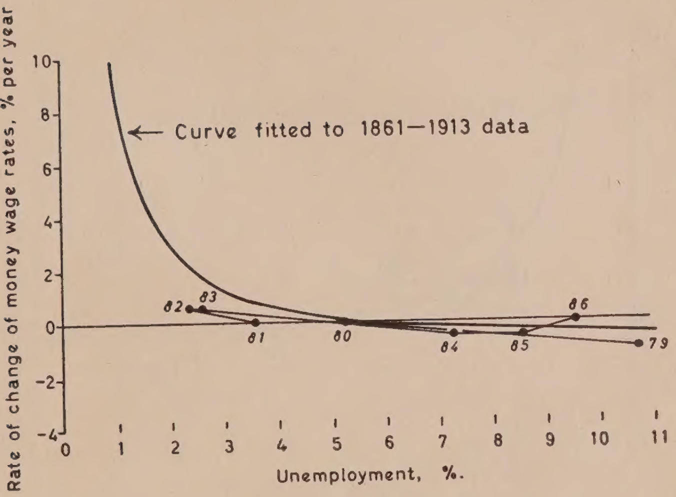

Fig. 4. 1879 —1886

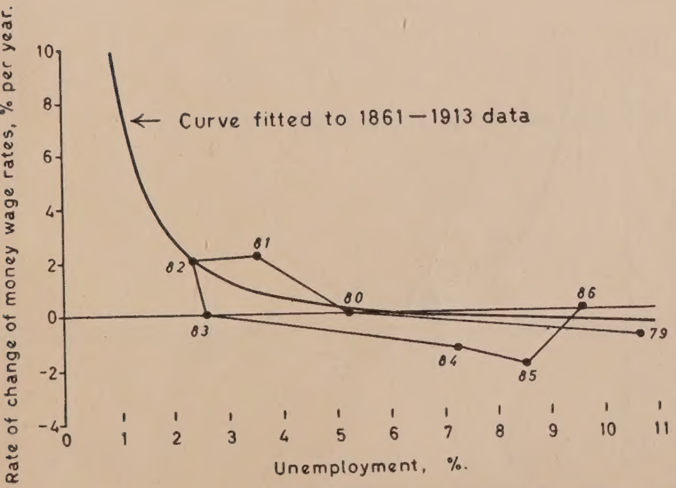

Fig. 4a. 1879—1886, using Bowley's wage index for the years 1881 to 1886

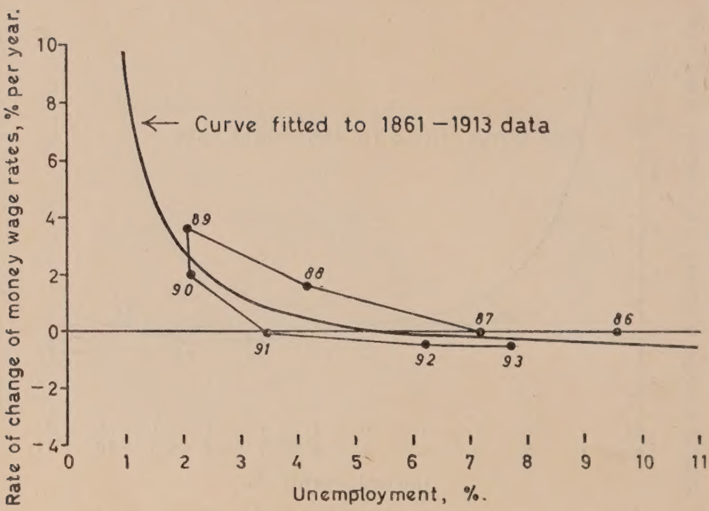

Fig. 5. 1886 — 1893

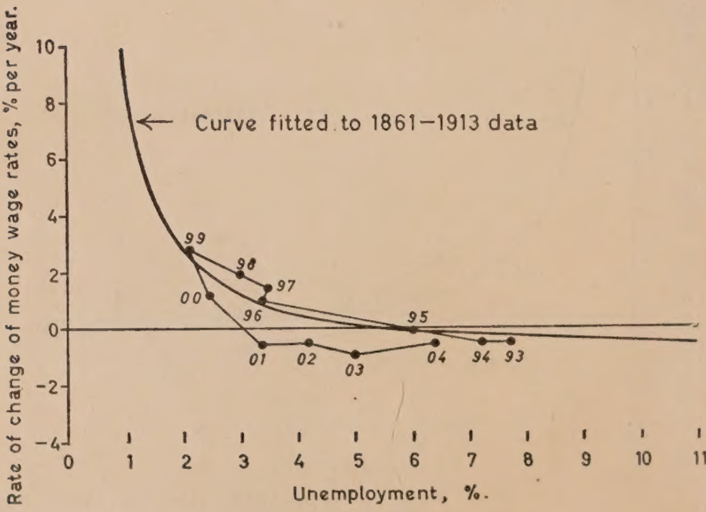

Fig. 6. 1893 — 1904

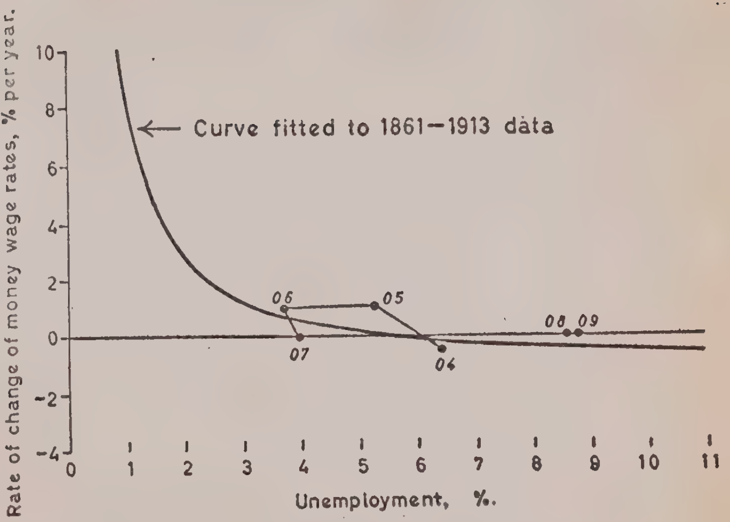

Fig. 7. 1904 — 1909

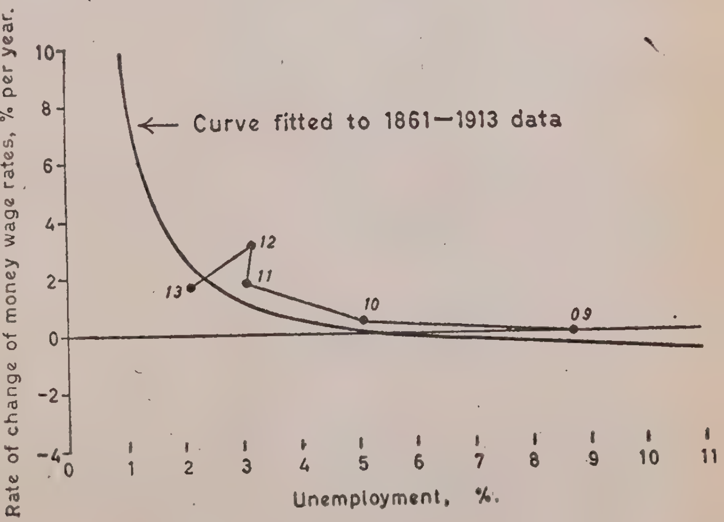

Fig. 8. 1909 — 1913

for 1861, and similarly for other years.[1] The percentage unemployment figures are those calculated by the Board of Trade and the Ministry of Labour[2] from trade union returns. The corresponding percentage employment figures are quoted in Beveridge, *Full Employment in a Free Society*, Table 22.

It will be seen from Figures 2 to 8 that there is a clear tendency for the rate of change of money wage rates to be high when unemployment is low and to be low or negative when unemployment is high. There is also a clear tendency for the rate of change of money wage rates at any given level of unemployment to be above the average for that level of unemployment when unemployment is decreasing during the upswing of a trade cycle and to be below the average for that level of unemployment when unemployment is increasing during the downswing of a trade cycle.

The crosses shown in Figure 1 give the average values of the rate of change of money wage rates and of the percentage unemployment in those years in which unemployment lay between 0 and 2, 2 and 3, 3 and 4, 4 and 5, 5 and 7, and 7 and 11 per cent. respectively (the upper bound being included in each interval). Since each interval includes years in which unemployment was increasing and years in which it was decreasing the effect of changing unemployment on the rate of change of wage rates tends to be cancelled out by this averaging, so that each cross gives an approximation to the rate of change of wages which would be associated with the indicated level of unemployment if unemployment were held constant at that level.

The curve shown in Figure 1 (and repeated for comparison in later diagrams) was fitted to the crosses. The form of equation chosen was

$$y + a = bx^c$$

or

$$\log (y + a) = \log b + c \log x$$

where y is the rate of change of wage rates and x is the percentage unemployment. The constants b and c were estimated by least squares using the values of y and x corresponding to the crosses in the four intervals between 0 and 5 per cent. unemployment, the constant a being chosen by trial and error to make the curve pass as close as possible to the remaining two crosses in the intervals between 5 and 11 per cent. unemployment.[3] The equation of the fitted curve is

$$y + 0{\cdot}900 = 9{\cdot}638x^{-1{\cdot}394}$$

or

$$\log (y + 0{\cdot}900) = 0.984 - 1{\cdot}394 \log x.$$

---

[1] The index is apparently intended to measure the average of wage rates during each year. The first central difference is therefore the best simple approximation to the average absolute rate of change of wage rates during a year and the central difference expressed as a percentage of the index number is an appropriate measure of the average percentage rate of change of wage rates during the year.

[2] *Memoranda upon British and Foreign Trade and Industrial Conditions* (Second Series) (Cd. 2337), B.P.P. 1905, Vol. 84; *21st Abstract of Labour Statistics, 1919–1933* (Cd. 4625), B.P.P. 1933–34, Vol. 26.

[3] At first sight it might appear preferable to carry out a multiple regression of y on the variables x and $\frac{dx}{dt}$. However, owing to the particular form of the relation

Considering the wage changes in individual years in relation to the fitted curve, the wage increase in 1862 (see Figure 2) is definitely larger than can be accounted for by the level of unemployment and the rate of change of unemployment, and the wage increase in 1863 is also larger than would be expected. It seems that the 12·5 per cent. increase in import prices between 1861 and 1862 referred to above (and no doubt connected with the outbreak of the American civil war) was in fact sufficient to have a real effect on wage rates by causing cost of living increases in wages which were greater than the increases which would have resulted from employers' demand for labour and that the consequent wage-price spiral continued into 1863. On the other hand the increases in import prices of 7·6 per cent. between 1899 and 1900 and again between 1909 and 1910 and the increase of 7·0 per cent. between 1871 and 1872 do not seem to have had any noticeable effect on wage rates. This is consistent with the hypothesis stated above about the effect of rising import prices on wage rates.

Figure 3 and Figures 5 to 8 show a very clear relation between the rate of change of wage rates and the level and rate of change of unemployment,[1] but the relation hardly appears at all in the cycle shown in Figure 4. The wage index of Phelps Brown and Sheila Hopkins from which the changes in wage rates were calculated was based on Wood's earlier index,[2] which shows the same stability during these years. From 1880 we have also Bowley's index of wage rates.[3] If the rate of change of money wage rates for 1881 to 1886 is calculated from Bowley's index by the same method as was used before, the results shown in Figure 4a are obtained, giving the typical relation between the rate of change of wage rates and the level and rate of change of unemployment. It seems possible that some peculiarity may have occurred in the construction of Wood's index for these years. Bowley's index for the remainder of the period up to 1913 gives results which are broadly similar to those shown in Figures 5 to 8, but the pattern is

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between y and x in the present case it is not easy to find a suitable linear multiple regression equation. An equation of the form $y + a = bx^c + k\left(\frac{1}{x^m} \cdot \frac{dx}{dt}\right)$ would probably be suitable. If so the procedure which has been adopted for estimating the relation that would hold between y and x if $\frac{dx}{dt}$ were zero is satisfactory, since it can easily be shown that $\frac{1}{x^m} \cdot \frac{dx}{dt}$ is uncorrelated with x or with any power of x provided that x is, as in this case, a trend-free variable.

[1] Since the unemployment figures used are the averages of monthly percentages, the first central difference is again the best simple approximation to the average rate of change of unemployment during a year. It is obvious from an inspection of Fig. 3 and Figs. 5 to 8 that in each cycle there is a close relation between the deviations of the points from the fitted curve and the first central differences of the employment figures, though the magnitude of the relation does not seem to have remained constant over the whole period.

[2] See Phelps Brown and Sheila Hopkins, *loc. cit.*, pp. 264-5.

[3] A. L. Bowley, *Wages and Income in the United Kingdom since 1860*, Table VII, p. 30.

rather less regular than that obtained with the index of Phelps Brown and Sheila Hopkins.

From Figure 6 it can be seen that wage rates rose more slowly than usual in the upswing of business activity from 1893 to 1896 and then returned to their normal pattern of change ; but with a temporary increase in unemployment during 1897. This suggests that there may have been exceptional resistance by employers to wage increases from 1894 to 1896, culminating in industrial strife in 1897. A glance at industrial history[1] confirms this suspicion. During the 1890's there was a rapid growth of employers' federations and from 1895 to 1897 there was resistance by the employers' federations to trade union demands for the introduction of an eight-hour working day, which would have involved a rise in hourly wage rates. This resulted in a strike by the Amalgamated Society of Engineers, countered by the Employers' Federation with a lock-out which lasted until January 1898.

From Figure 8 it can be seen that the relation between wage changes and unemployment was again disturbed in 1912. From the monthly figures of percentage unemployment in trade unions[2] we find that unemployment rose from 2·8 per cent. in February 1912 to 11.3 per cent. in March, falling back to 3·6 per cent. in April and 2·7 per cent. in May, as the result of a general stoppage of work in coal mining. If an adjustment is made to eliminate the effect of the strike on unemployment the figure for the average percentage unemployment during 1912 would be reduced by about 0·8 per cent., restoring the typical pattern of the relation between the rate of change of wage rates and the level and rate of change of unemployment.

From a comparison of Figures 2 to 8 it appears that the width of loops obtained in each trade cycle has tended to narrow, suggesting a reduction in the dependence of the rate of change of wage rates on the rate of change of unemployment. There seem to be two possible explanations of this. First, in the coal and steel industries before the first world war sliding scale adjustments were common, by which wage rates were linked to the prices of the products.[3] Given the tendency of product prices to rise with an increase in business activity and fall with a decrease in business activity, these agreements may have strengthened the relation between changes in wage rates and changes in unemployment in these industries. During the earlier years of the period these industries would have fairly large weights in the wage index, but with the greater coverage of the statistical material available in later years the weights of these industries in the index would be reduced. Second, it is possible that the decrease in the width of the loops resulted not so much from a reduction in the dependence of wage changes on changes in unemployment as from the introduction of a time lag in the response of wage changes to changes in the level of unemployment, caused by the extension of collective bargaining and particularly by the growth of arbitration and conciliation procedures. If such a time lag existed in the later years of the period the wage change in any year should be related, not to average unemployment during that year, but to the average unemployment lagged by, perhaps, several months. This would have the effect of moving each point in the diagrams horizontally part of the way towards the point of the preceding year and it can easily be seen that this would widen the loops in the diagrams. This fact makes it difficult to discriminate at all closely between the effect of time lags and the effect of dependence of wage changes on the rate of change of unemployment.

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[1] See B. C. Roberts, *The Trades Union Congress, 1868-1921*, Chapter IV, especially pp. 158-162.

[2] *21st Abstract of Labour Statistics, 1919–1933, loc. cit.*

[3] I am indebted to Professor Phelps Brown for pointing this out to me.

III. 1913-1948

A scatter diagram of the rate of change of wage rates and percentage unemployment for the years 1913-1948 is shown in Figure 9. From 1913 to 1920 the series used are a continuation of those used for the period 1861-1913. From 1921 to 1948 the Ministry of Labour's index of hourly wage rates at the end of December of each year[1] has been used, the percentage change in the index each year being taken as a measure of the average rate of change of wage rates during that year. The Ministry of Labour's figures for the percentage unemployment in the United Kingdom[2] have been used for the years 1921-1945. For the years 1946-1948 the unemployment figures were taken from the *Statistical Yearbooks* of the International Labour Organisation.

It will be seen from Figure 9 that there was an increase in unemployment in 1914 (mainly due to a sharp rise in the three months following the commencement of the war). From 1915 to 1918 unemployment was low and wage rates rose rapidly. The cost of living was also rising rapidly and formal agreements for automatic cost of living adjustments in wage rates became widespread, but it is not clear whether the cost of living adjustments were a real factor in increasing wage rates or whether they merely replaced increases which would in any case have occurred as a result of the high demand for labour. Demobilisation brought increased unemployment in 1919 but wage rates continued to rise rapidly until 1920, probably as a result of the rapidly rising import prices, which reached their peak in 1920, and consequent cost of living adjustments in wage rates. There was then a sharp increase in unemployment from 2·6 per cent. in 1920 to 17·0 per cent. in 1921, accompanied by a fall of 22·2 per cent. in wage rates in 1921. Part of the fall can be explained by the extremely rapid increase in unemployment, but a fall of 12·8 per cent. in the cost of living, largely a result of falling import prices, was no doubt also a major factor. In 1922 unemployment was 14·3 per cent. and wage rates fell by 19·1 per cent. Although

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[1] *Ministry of Labour Gazette*, April, 1958, p. 133.

[2] *Ibid.*, January, 1940 and subsequent issues.

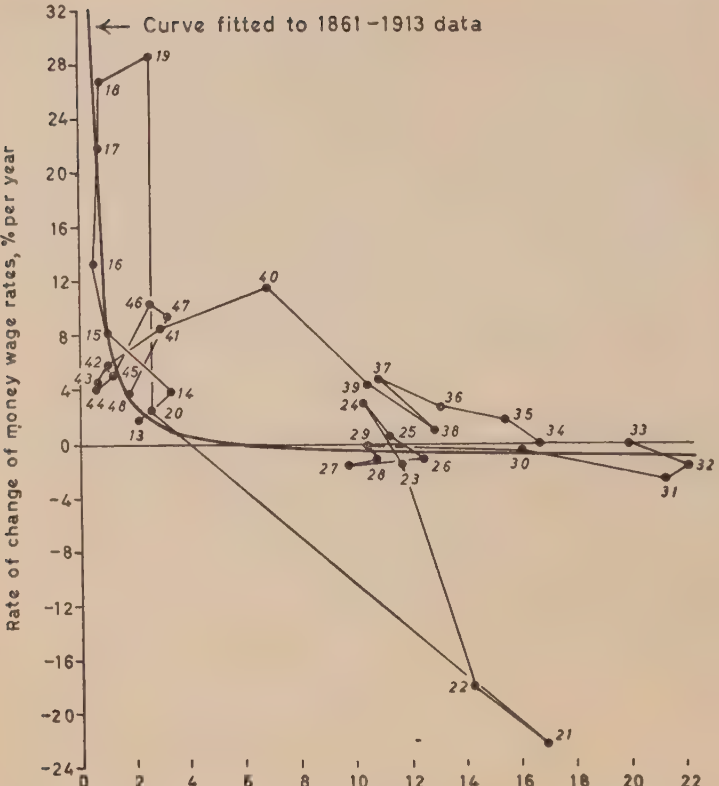

Fig. 9 1913–1948

unemployment was high in this year it was decreasing, and the major part of the large fall in wage rates must be explained by the fall of 17·5 per cent. in the cost of living index between 1921 and 1922. After this experience trade unions became less enthusiastic about agreements for automatic cost of living adjustments and the number of these agreements declined.

From 1923 to 1929 there were only small changes in import prices and in the cost of living. In 1923 and 1924 unemployment was high but decreasing. Wage rates fell slightly in 1923 and rose by 3·1 per cent. in 1924. It seems likely that if business activity had continued to improve after 1924 the changes in wage rates would have shown the usual pattern of the recovery phase of earlier trade cycles. However, the decision to check demand in an attempt to force the price level down in order to restore the gold standard at the pre-war parity of sterling prevented the recovery of business activity and unemployment remained fairly steady between 9·7 per cent. and 12·5 per cent. from 1925 to 1929. The average level of unemployment during these five years was 10·94 per cent. and the average rate of change of wage rates was −0·60 per cent. per year. The rate of change of wage rates calculated from the curve fitted to the 1861-1913 data for a level of unemployment of 10·94 per cent. is −0·56 per cent. per year, in close agreement with the average observed value. Thus the evidence does not support the view, which is sometimes expressed, that the policy of forcing the price level down failed because of increased resistance to downward movements of wage rates. The actual results obtained, given the levels of unemployment which were held, could have been predicted fairly accurately from a study of the pre-war data, if anyone had felt inclined to carry out the necessary analysis.

The relation between wage changes and unemployment during the 1929-1937 trade cycle follows the usual pattern of the cycles in the 1861-1913 period except for the higher level of unemployment throughout the cycle. The increases in wage rates in 1935, 1936 and 1937 are perhaps rather larger than would be expected to result from the rate of change of employment alone and part of the increases must probably be attributed to cost of living adjustments. The cost of living index rose 3·1 per cent. in 1935, 3·0 per cent. in 1936 and 5·2 per cent. in 1937, the major part of the increase in each of these years being due to the rise in the food component of the index. Only in 1937 can the rise in food prices be fully accounted for by rising import prices; in 1935 and 1936 it seems likely that the policies introduced to raise prices of home-produced agricultural produce played a significant part in increasing food prices and so the cost of living index and wage rates. The extremely uneven geographical distribution of unemployment may also have been a factor tending to increase the rapidity of wage changes during the upswing of business activity between 1934 and 1937.

Increases in import prices probably contributed to the wage increases in 1940 and 1941. The points in Figure 9 for the remaining war years show the effectiveness of the economic controls introduced. After an increase in unemployment in 1946 due to demobilisation and in 1947 due to the coal crisis, we return in 1948 almost exactly to the fitted relation between unemployment and wage changes.

IV. 1948-1957

A scatter diagram for the years 1948-1957 is shown in Figure 10. The unemployment percentages shown are averages of the monthly unemployment percentages in Great Britain during the calendar years indicated, taken from the *Ministry of Labour Gazette*. The Ministry of Labour does not regularly publish figures of the percentage unemployment in the United Kingdom ; but from data published in the *Statistical Yearbooks* of the International Labour Organisation it appears that unemployment in the United Kingdom was fairly consistently about 0·1 per cent. higher than that in Great Britain throughout this period. The wage index used was the index of weekly wage rates, published monthly in the *Ministry of Labour Gazette*, the percentage change during each calendar year being taken as a measure of the average rate of change of money wage rates during the year. The Ministry does not regularly publish an index of hourly wage rates ;[1] but an index of normal weekly hours published in the *Ministry of Labour Gazette* of September 1957 shows a reduction of 0·2 per cent. in 1948 and in 1949 and an average annual reduction of approximately 0·04 per cent. from 1950 to 1957. The percentage changes in hourly rates would therefore be greater than the percentage changes in weekly rates by these amounts.

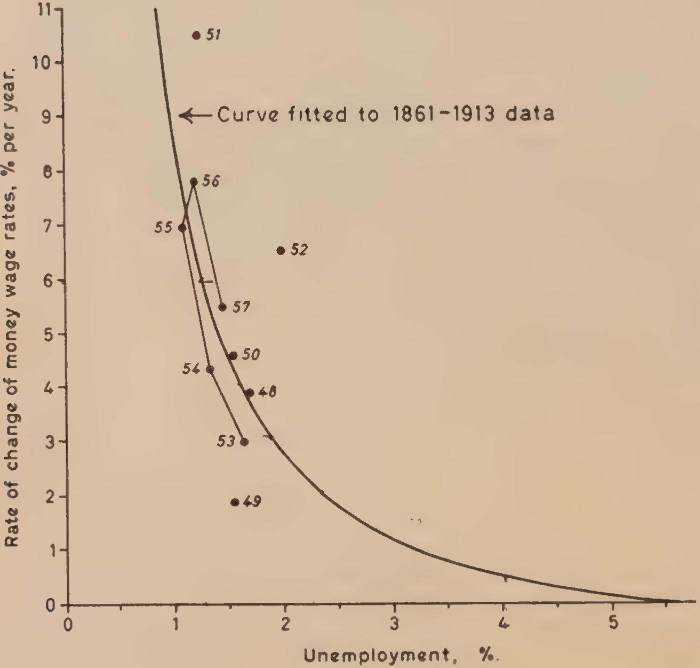

Fig. 10. 1948-1957

It will be argued later that a rapid rise in import prices during 1947 led to a sharp increase in retail prices in 1948 which tended to stimulate wage increases during 1948, but that this tendency was offset by the policy of wage restraint introduced by Sir Stafford Cripps in the spring of 1948 ; that wage increases during 1949 were exceptionally low as a result of the policy of wage restraint ; that a rapid rise in import prices during 1950 and 1951 led to a rapid rise in retail prices during 1951 and 1952 which caused cost of living increases in wage rates in excess of the increases that would have occurred as a result of the demand for labour, but that there were no special factors of wage restraint or rapidly rising import prices to affect the wage increases in 1950 or in the five years from 1953 to 1957. It can be seen from Figure 10 that the point for 1950 lies very close to the curve fitted to the 1861-1913 data and that the points for 1953 to 1957 lie on a narrow loop around this curve, the direction of the loop being the reverse of the direction of the loops shown in Figures 2 to 8. A loop in this direction could result from a time lag in the adjustment of wage rates. If the rate of change of wage rates during each calendar year is related to unemployment lagged seven months, i.e. to the average of the monthly percentages of unemployment from June of the preceding year to May of that year, the scatter diagram shown in Figure 11 is obtained. The loop has now disappeared and the points for the years 1950 and 1953

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[1] An index of hourly wage rates covering the years considered in this section is, however, given in the *Ministry of Labour Gazette* of April, 1958.

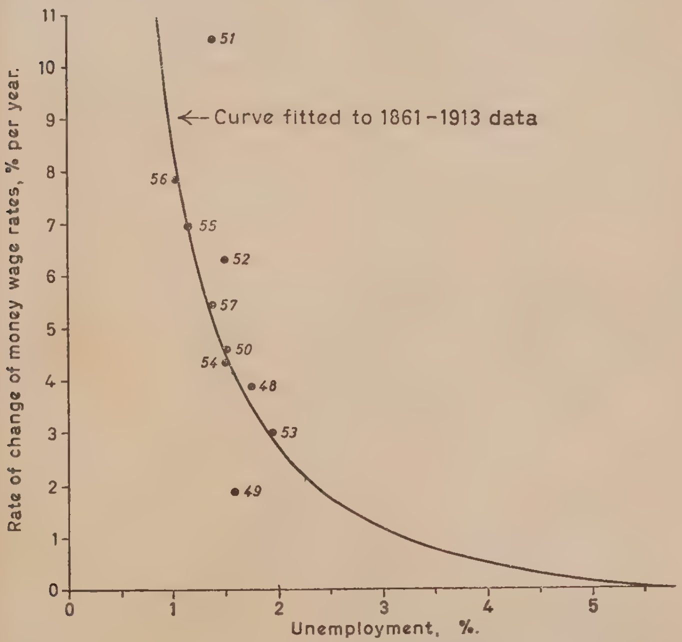

Fig. 11. 1948—1957, with unemployment lagged 7 months

to 1957 lie closely along a smooth curve which coincides almost exactly with the curve fitted to the 1861-1913 data.

In Table 1 below the percentage changes in money wage rates during the years 1948-1957 are shown in column (1). The figures in column (2) are the percentage changes in wage rates calculated from the curve fitted to the 1861-1913 data corresponding to the unemployment percentages shown in Figure 11, i.e. the average percentages of unemployment lagged seven months. On the hypothesis that has been used in this paper, these figures represent the percentages by which wage rates would be expected to rise, given the level of employment for each year, as a result of employers' competitive bidding for labour, i.e. they represent the " demand pull " element in wage adjustments.

TABLE 1

	(1) Change in wage rates	(2) Demand pull	(3) Cost push	(4) Change in import prices
1947	..	..	..	20·1
1948	3·9	3·5	7·1	10·6
1949	1·9	4·1	2·9	4·1
1950	4·6	4·4	3·0	26·5
1951	10·5	5·2	9·0	23·3
1952	6·4	4·5	9·3	-11·7
1953	3·0	3·0	3·0	-4·8
1954	4·4	4·5	1·9	5·0
1955	6·9	6·8	4·6	1·9
1956	7·9	8·0	4·9	3·8
1957	5·4	5·2	3·8	-7·3

The relevant figure on the cost side in wage negotiations is the percentage increase shown by the retail price index in the month in which the negotiations are proceeding over the index of the corresponding month of the previous year. The average of these monthly percentages for each calendar year is an appropriate measure of the " cost push " element in wage adjustments, and these averages[1] are given in column (3). The percentage change in the index of import prices[2] during each year is given in column (4).

From Table 1 we see that in 1948 the cost push element was considerably greater than the demand pull element, as a result of the lagged effect on retail prices of the rapid rise in import prices during the previous year, and the change in wage rates was a little greater than could be accounted for by the demand pull element. It would probably have been considerably greater but for the co-operation of the trade unions in Sir Stafford Cripps' policy of wage restraint. In 1949 the cost element was less than the demand element and the actual change in wage rates was also much less, no doubt as a result of the policy of wage restraint which is generally acknowledged to have been effective in 1949. In 1950 the cost element was lower than the demand element and the actual wage change was approximately equal to the demand element.

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[1] Calculated from the retail price index published in the *Monthly Digest of Statistics*. The figure for 1948 is the average of the last seven months of the year.

[2] *Board of Trade Journal.*

Import prices rose very rapidly during 1950 and 1951 as a result of the devaluation of sterling in September 1949 and the outbreak of the Korean War in 1950. In consequence the retail price index rose rapidly during 1951 and 1952 so that the cost element in wage negotiations considerably exceeded the demand element. The actual wage increase in each year also considerably exceeded the demand element so that these two years provide a clear case of cost inflation.

In 1953 the cost element was equal to the demand element and in the years 1954 to 1957 it was well below the demand element. In each of these years the actual wage increase was almost exactly equal to the demand element. Thus in these five years, and also in 1950, there seems to have been pure demand inflation.

V. CONCLUSIONS

The statistical evidence in Sections II to IV above seems in general to support the hypothesis stated in Section I, that the rate of change of money wage rates can be explained by the level of unemployment and the rate of change of unemployment, except in or immediately after those years in which there is a sufficiently rapid rise in import prices to offset the tendency for increasing productivity to reduce the cost of living.

Ignoring years in which import prices rise rapidly enough to initiate a wage-price spiral, which seem to occur very rarely except as a result of war, and assuming an increase in productivity of 2 per cent. per year, it seems from the relation fitted to the data that if aggregate demand were kept at a value which would maintain a stable level of product prices the associated level of unemployment would be a little under $2\frac{1}{2}$ per cent. If, as is sometimes recommended, demand were kept at a value which would maintain stable wage rates the associated level of unemployment would be about $5\frac{1}{2}$ per cent.

Because of the strong curvature of the fitted relation in the region of low percentage unemployment, there will be a lower average rate of increase of wage rates if unemployment is held constant at a given level than there will be if unemployment is allowed to fluctuate about that level.

These conclusions are of course tentative. There is need for much more detailed research into the relations between unemployment, wage rates, prices and productivity.

The London School of Economics.

Liquidity Preference and Loanable Funds: Stock and Flow Analysis[1]

By Don Patinkin

Despite Hicks' demonstration nearly twenty years ago of the equivalence between liquidity-preference and loanable-funds theories of interest, the debate on this issue continues to fill the pages of the journals. Indeed, on this issue the 1950's have seen a revival of the polemics of the 1930's. It is not my purpose here to provide a systematic survey of this revival. Instead I shall restrict myself to two arguments that have been advanced in implicit or explicit rebuttal of Hicks' demonstration—and will show why they are invalid. The first argument bases itself on the distinction between stock and flow analysis—and will be discussed in Section 1. The second bases itself on the distinction between static and dynamic analysis—and this will be discussed in Section 2.[2] The argument of both these sections is carried out on the assumption of full employment; a generalization—under certain assumptions—to the case of unemployment is presented in Section 3.

1. Let us start with Hicks' classic demonstration.[3] This can be restated in the form of the following two propositions:

1 (a) Consider an economy with n goods, consisting of n-2 commodities (inclusive of services), bonds (perpetuities), and money. In the corresponding system of n excess-demand equations, one of the equations is redundant and can be eliminated—that is, if any n-1 excess-demand equations are satisfied, the remaining one must also be satisfied. This will be called Walras' Law.

(b) It follows that a general-equilibrium analysis of the commodity and bond markets yields exactly the same equilibrium rate of interest as that yielded by an analysis of the commodity and money markets.

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[1] This paper was first presented in the form of two public lectures at the London School of Economics in March 1958. The only subsequent major modifications are indicated below on p. 311, note 1, and p. 314, note 2.

In the process of preparing this paper, I have benefited from stimulating correspondence with Professor William Baumol. I am also indebted to my colleague, Dr. Amotz Morag, for his comments on an earlier draft.

[2] Cf., e.g., the discussion by L. R. Klein, W. Fellner, H. M. Somers, and K. Brunner on "Stock and Flow Analysis in Economics", *Econometrica*, XVIII (1950), 236-52; H. G. Johnson, "Some Cambridge Controversies in Monetary Theory", *Review of Economic Studies*, XIX (1951-52), 90-93; D. H. Robertson, "Comments on Mr. Johnson's Notes", *ibid.*, pp. 105-106; F. H. Hahn, "The Rate of Interest and General Equilibrium Analysis", *Economic Journal*, LXV (1955), 52-66; S. C. Tsiang, "Liquidity Preference and Loanable Funds Theories", *American Economic Review*, XLVI (1956), 539-52 and the subsequent comment by G. Ackley in the same journal XLVII (1957), 662-73; Hugh Rose, "Liquidity Preference and Loanable Funds", *Review of Economic Studies*, XXIV (1957), 111-19.

[3] J. R. Hicks, *Value and Capital* (Oxford, 1939), pp. 157-62.

2 (a) The following classification system is adopted : A theory which chooses to eliminate the money equation and to determine the rate of interest in the commodity and bond markets is called a " loanable-funds theory " ; and one which chooses to eliminate the bond equation and to determine the rate in the commodity and money markets, a " liquidity-preference theory ".

(b) By Proposition 1 (b), the loanable-funds theory is equivalent to the liquidity-preference theory.

I have restated Hicks' argument in this over-elaborate way in order to place in proper perspective the oft-repeated Lerner quip : " And what kind of an interest theory do we have if we eliminate the equation for peanuts ? " This is a well taken criticism of *part* of the foregoing statement. In more dignified terms, Lerner's quip demonstrates the inadequacy and incompleteness of the classificatory system of Proposition 2 (a). It shows that this system does not tell us how to classify a theory which retains *both* the bond and money equations, and drops instead one of the commodity equations. But the proper inference to be drawn from this fact is not that the whole Hicksian approach is wrong—which is the kind of inference we sometimes find in the literature[1]—but simply that we should get rid of its classificatory system. In other words, we should dispense with Proposition 2, while retaining Proposition 1.

Indeed, a full understanding of Proposition 1 leads to the conclusion that it is meaningless to classify interest theories by the nature of the equation chosen for elimination. For by the very nature of Walras' Law it can make no difference which of the n equations is so eliminated. Every one of the possible subsets of n-1 equations is equivalent—for each is equivalent to the full set of n equations written in such a way as to make the equational dependence explicit. Hence it is meaningless to attempt to associate these different subsets with different theories. In brief, from this viewpoint there is only *one* theory of interest—or, for that matter, of any other economic variable : the general-equilibrium theory represented by the full set of n equations.

So much for Proposition 2. Let us now turn to Proposition 1. In order to evaluate some recent criticisms of this proposition, it is best to repeat briefly one possible demonstration of it.[2] For simplicity—and without affecting the general validity of the demonstration—we can consider the case of an exchange economy operating on Hicksian weeks. Any individual will, at the beginning of any given week, be making plans for his expenditures on and receipts from commodities, for his borrowing and lending activities, and for his money holdings at the end of the week. Let us designate by "demand for money flow" the amount of money which the individual plans to receive during the week in these various ways, and by "supply of money flow," the amount he plans to spend. Then for any individual the following budget relationships obtain :

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[1] Cf., e.g., Tsiang, *loc. cit.*, pp. 540-41.

[2] Cf. Oscar Lange, " Say's Law : A Restatement and Criticism ", *Studies in Mathematical Economics and Econometrics*, ed. O. Lange, *et al.* (Chicago, 1942), p. 50.

amount of money flow demanded (f^d)
= inflow of money from planned supply of commodities (s)
(1) + inflow of money from planned borrowing (b)
+ inflow of money from interest receipts on the perpetuities held at the beginning of the week (r).

Similarly,

amount of money flow supplied (f^s)
= outflow of money on planned demand for commodities (d)
(2) + outflow of money on planned lending (l)
+ outflow of money on interest payments on the perpetuities outstanding at the beginning of the week (p).

Obviously, for any given individual, at most one of the items b or l can be positive, while the other must be zero—though, of course, both can be zero. The same statement holds for items r and p.

If we aggregate equations (1) and (2) over all the individuals of the economy and then subtract these aggregated equations from one another, we obtain the budget restraint for the economy as a whole.

$$F^d - F^s = (S - D) + (B - L) + (R - P), \tag{3}$$

where F^d, F^s, D, . . . are the aggregate counterparts of f^d, f^s, d, . . .

Now, since we are assuming the economy to be closed and without a government, every perpetuity held by one member of the economy represents a debt outstanding of another. Hence total interest receipts, R, must always equal total interest payments, P – so that the last parenthetical term of (3) must be zero no matter what prices and interest rate prevail in the economy. This is not true for the terms S – D and B – L. Only at the set of prices and interest rate which equilibrates the commodity and bond markets, respectively, will these equal zero. It follows immediately from equation (3) that at this set of prices $F^d - F^s$ must also equal zero, so that the demand and supply for money flows must also be in equilibrium. Alternatively, if the money and commodity markets are in equilibrium, then it follows from (3) that the bond market must be in equilibrium.

In this way we have demonstrated Proposition 1 : that it makes no difference for our equilibrium analysis whether we treat the money or bond equation as redundant. Correspondingly, if we insist on classifying theories as "loanable funds" or "liquidity preference" according to the equation "dropped" (though the irrelevance of this classification has been demonstrated above), then we have demonstrated the equivalence of these two theories.

The validity of this demonstration has recently been challenged on the grounds that it uses "demand for money" and "supply of money" in the sense of *flows*, whereas the Keynesian liquidity preference theory uses them in the sense of *stocks*—and that these two will not be equal in magnitude " unless the period of time over which the flows of money expenditures are measured is so defined as to make them equal ".[1] Correspondingly, it is claimed, all equation (3) demonstrates is that the demand and supply for money *flows* must be equal (when the bond and commodity markets are in equilibrium) ; it does not demonstrate this equality for the demand and supply for money *stocks*.

This, however, is a *non sequitur*. True, the demand for money as a flow is quite different from the demand for money as a stock ; in fact, they do not even have the same dimensions ! Nevertheless, the *excess* demand for money as a flow is identical with the *excess* demand for money as a stock. And since for the determination of the rate of interest it is only the system of *excess*-demand equations which is relevant, the difference between the demand functions is completely immaterial.

This conclusion can be readily proven. Indeed, it is the direct implication of the simple accounting identity that the stock at the end of a period must equal the stock at the beginning *plus* the net inflow during the period. In order to show this let us return to our simple exchange economy and analyze the budget restraint of a representative individual from a slightly different viewpoint. Let m^d represent the individual's demand for cash balances at the end of the period—that is, his planned holdings of money at that time. Similarly, let m_0 represent his initial money holdings—the quantity of money with which he began this week. Then the foregoing accounting identity states :

$$(4)\quad m^d = m_0 + (s - d) + (b - l) + (r - p),$$

where the three parenthetical terms represent the planned net inflows of cash from commodity, borrowing, and interest transactions, respectively. Transposing m_0 and aggregating over all individuals, this becomes the budget restraint for the economy as a whole

$$(5)\quad M^d - M_0 = (S - D) + (B - L) + (R - P).$$

As before, $R - P$ is zero no matter what prices and interest prevail in the economy.

We now note that the right-hand side of (5) is identical with the right-hand side of (3). Hence the left-hand sides must also be identical. But the left-hand side is nothing else but the excess demand for money considered as a *stock*. For M_0 is the total amount of money actually existing in the economy—and hence is the aggregate supply of money in the sense of a stock—while M^d is the total stock of money demanded.

We also note that the *excess* demand for money as a *stock* has the dimensions of a *flow*. For it is the difference between the stock of money at two points of time : the end and beginning of the week, respectively. This is as it should be. For this excess demand can then be properly equated—as in equation (5)—to the *flows* of money payments during the week. Furthermore, it can readily be shown that this relationship holds even after we drop the simplifying assumption that the quantity of money in existence at the end of the week equals that at the beginning—and permit the existence of a monetary authority which can change the stock of money during the course of the week.[1]

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[1] Tsiang, *loc. cit.*, p. 542.

To summarize, though the flow demand F^d is entirely different from the stock demand M^d, and though F^s is different from M_0, the *excess* demands $F^d - F^s$ and $M^d - M_0$ are identical. Hence any set of prices and interest which equilibrates the money market when viewed as consisting of flows, must also equilibrate it when viewed as stocks, and *vice versa*. In so far as equilibrium analysis is concerned, no difference can arise from this difference in viewpoints.

All this is capable of a direct, common-sense, and even obvious interpretation. Consider our individual possessed of a certain quantity of money on Monday morning and making his plans then for (among other things) the amount of money he wants to have in his possession next Sunday night. If at a certain set of prices and interest rate he decides to hold a stock of money next Sunday night which is $\triangle M$ dollars greater than his initial stock, then he has by that very fact decided to arrange his purchases and sales during the week so as to provide a net inflow of $\triangle M$ dollars. There is no other way of affecting the level of a stock than by affecting the net inflow which accrues to that stock. Hence a decision on a stock implies a consistent decision on the corresponding flow, and *vice versa*. In other words, an individual can be satisfied with the level of his planned stock at the end of the week if and only if he is satisfied with his planned net inflow during the week.

It should also be clear that though we have above analyzed the bond market in terms of the demand and supply for flows (lending and borrowing), we could just as well have carried out the analysis in terms of the demand and supply for the stocks of perpetuities. In particular, let C_0 represent the initial number of perpetuities held by creditors. By the assumption of a closed economy, this is also the number of debtors' perpetuities outstanding. The creditors' demand for the stock of perpetuities at the end of the week (C^d) is accordingly

(6) $C^d = C_0 + L,$

while the supply is

(7) $C^s = C_0 + B.$

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[1] The argument in this more generalized form was presented in my " Indeterminacy of Absolute Prices in Classical Economic Theory ", *Econometrica*, XVII (1949), Section 8.

Actually, the essence of the argument in the text is already contained in two short footnotes in Lange's original paper ; *loc. cit.*, p. 52, note 3, and p. 65, note 26.

Having disposed in this way of Tsiang's criticism of Hicks' argument, we can also dispense with Tsiang's attempted solution to the problem—which amounts to arbitrarily taking a period of just such a length that income during it is equal to the stock of money held. As is clear from the text, this is a completely unnecessary restriction on the argument.

Subtracting (7) from (6) we obtain

(8) $C^d - C^s = L - B.$

Thus the excess demand in the bond market considered from the viewpoint of stocks must necessarily equal the excess demand considered from the viewpoint of flows.[1]

In this way we also see that the choice between the money and bond equations has nothing at all to do with the choice between stock and flow analysis. Either of these equations can be—with equivalent results—analyzed from either analytical viewpoint.

At this point I would like to venture the suggestion that all of economic analysis is really concerned with flows and not stocks. For there are two possibilities : either the stock is immutably fixed—and always has been so—in which case there is nothing to analyze ; or the stock is subject to variation—in which case this variation constitutes a flow which can be analyzed as such. This and the preceding discussion should point out the *non sequitur* in the contention sometimes advanced that only stock analysis is appropriate for those economic goods whose existing stock is very great in comparison with current production. Clearly, the analysis of any such good can be carried out just as well in terms of the flow of current production—though in this analysis the existing stock will obviously be one of the factors that must be taken into consideration. Even the level of the mighty ocean is analyzed in terms of the relatively puny variations in the inflows and outflows of water due to climatic factors.

I would also like to conjecture that there have been more errors of omission in connection with stock and flow analysis than errors of commission : more valid propositions which were stillborn because of unnecessary inhibitions about using " stock " and " flow " in the same sentence, than invalid propositions which went afoul on the improper combination of these terms. In a certain sense this is a very safe—because unverifiable—conjecture : for there is no record of the unuttered propositions. But I do think I am referring here to a real phenomenon. Thus, for example, we sometimes encounter completely unfounded fears about writing functions which depend on both a stock and a flow. The baselessness of such fears is sufficiently established by our simple accounting identity (4) above—which states that the *stock* at the end of a period *equals* the *stock* at the beginning of the period *plus* the net *flow* during the period. There is obviously nothing illegitimate about this functional relationship. Similarly, there is no logical reason why we should hesitate to say that a firm's supply of a given commodity during a given period depends on the *flow* of raw materials purchased during that period as well as on the *stock* available at the beginning. Nor, finally, should we hesitate to say that the demand function for any given commodity depends on the *flow* of income during the period in question as well as on the *stock* of asset holdings at its beginning.

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[1] Thus I agree with Fellner and Somers in their debate with Klein referred to on p. 300, note 2 above. But Fellner and Somers make an unnecessary concession when they state that the equivalence between stock and flow analysis holds only if " equilibrium was established at the end of [the preceding] period " (*Econometrica*, XVIII (1950), p. 243). As we have just seen, this equivalence is in no way dependent on the existence of any such prior equilibrium ; it is instead the simple consequence of the economy's being closed—though the argument can readily be generalized to the case of an open economy too.

Similarly, we must reject Fellner and Somers' statement that " the value of a variable cannot equate the demand for anything with the supply of anything *over a period of time*, unless it also accomplishes the equality of the willingness to hold that thing and the existing stock of that thing *at any point of time during the period* ". In order for this statement to be correct the second italicized phrase should be replaced by " at the end of the period ". (The quotation is from W. Fellner and H. M. Somers, " Note on ' Stocks ' and ' Flows ' in Monetary Interest Theory ", *Review of Economics and Statistics*, XXXI (1949), 146— with second set of italics added.)

This basic proposition is, however, correctly stated by Fellner and Somers in the sentence following the one just quoted. This reads : " Any infinitesimal period during which members of the public obtain what they want but do not yet possess, and during which they get rid of what they do not want but do possess, must end with a point of time at which they hold precisely what they wish to hold. This is self-evident ".

Before concluding this part of the paper, I should like to restate its general argument in the following way : Stock analysis, as well as flow analysis, presupposes a period of time : namely the period between the moment *at* which the individual is making his plans, and the moment *for* which he is making them. Hence if the periods presupposed by the analyses are the same, the excess-demand function of stock analysis must be identical with that of flow analysis. This proposition holds also in the limiting case where the period is an instantaneous one.

Conversely, if the periods presupposed by the two analyses are *not* the same, then the two excess-demand functions will also generally *not* be the same. Thus, for example, assume that we are conducting our stock analysis on the basis of a month, and our flow analysis on the basis of the first week of this month. Obviously, there is no reason for the two excess demands described by these two analyses to be equal. And this will be the case even if the stock excess demand should be zero. For even though prices and interest may be such that the individual is planning to hold the same stock of money at the end of the month as at the beginning (i.e., excess demand equal to zero), there is no reason why he might not be planning to have an excess inflow of money during the first week of that month (i.e., an excess demand for money), to be offset in subsequent weeks by corresponding excess outflows (i.e., excess supplies).

It should, however, be obvious that the different excess demands in these cases are not the result of any alleged difference between stock and flow analysis as such, but rather the result of our using two different periods of time in our two different analyses. Clearly, these same differences between excess demands would remain even if we were to apply stock analysis—or flow analysis—to *both* cases. All this is the reflection of the simple fact that the prices and interest rate which might equilibrate an economy over a period of a month need not do so over a period of a week—and conversely.

It should also be clear from the above that the distinction that is sometimes attempted between " flow equilibrium " and " stock equilibrium " is an inadvisable one. Once again, if the periods are the same, the existence of one type of equilibrium implies the existence of the other. And if they are not the same, then it is much better to make the required distinction explicitly in terms of the familiar Marshallian " instantaneous ", " short run ", and " long run " ; or the Hicksian " temporary equilibrium " and " equilibrium over time " ;[1] or any other classification which emphasizes that the relevant criteria are the periods of time over which the analysis is carried out. We only confuse the real nature of the issue if we introduce the terms " stock " and " flow " into a context where they really do not belong.

2. The analysis of the preceding section was restricted to that of static equilibrium. It has, however, sometimes been contended that the difference between liquidity-preference and loanable-funds theories is one that manifests itself only in dynamic analysis. In order to examine the validity of this contention, it will be convenient to sketch out first a graphical technique for dynamic analysis which I have described more fully elsewhere.[2]

For simplicity, let us continue with our full-employment assumption. Consider an economy with four markets : commodities, labor, bonds, and paper money. Assume that the real demand for each of these goods depends on real income (assumed constant), the rate of interest (r), and the real value of cash balances (M_0/p). By assumption, the labor market is always in equilibrium. The analysis of the determination of the equilibrium price level and rate of interest in this model can now be carried out in terms of Figure 1, where CC represents the locus of all combinations of r and p at which the commodity market is in equilibrium, while BB represents the corresponding locus for the bond market. These two curves intersect at the equilibrium point (p_0, r_0), and divide our diagram into four sectors, designated by roman numerals. At any point in Sectors I-II there exists an excess supply of commodities (denoted by " $C < O$ ") driving the price level downward ; and at any point in Sectors III-IV an excess demand (" $C > O$ ") driving them upwards. Similarly, at any point in Sectors II-III there exists an excess demand for bonds (" $B > O$ ") driving their price upwards, and thereby driving interest downwards ; while at any point in Sectors IV-I there is an excess supply (" $B < O$ ") driving the rate upwards. The directions of these dynamic pressures are indicated by the arrows in Figure 1. Under certain assumptions, it can be shown that this dynamic process is a stable one—but this does not interest us here.

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[1] Hicks, *op. cit.*, p. 132.

[2] *Money, Interest, and Prices* (Evanston, Ill., 1956), Chapter X : 2.

Let us now consider the remaining market, that for money. The locus of all combinations of price level and interest rate that equilibrate this market would also yield a positively sloped curve in Figure 1 : for a rise in interest decreases the amount of real cash balances demanded ; hence—in order to maintain equilibrium—there must take place a rise in the price level to decrease the real supply correspondingly.[1] By virtue of Walras' Law we also know that this curve must pass through the point (p_0, r_0) : for any point which equilibrates the commodity and bond markets must also equilibrate the money market. Can we say anything more about this curve ?

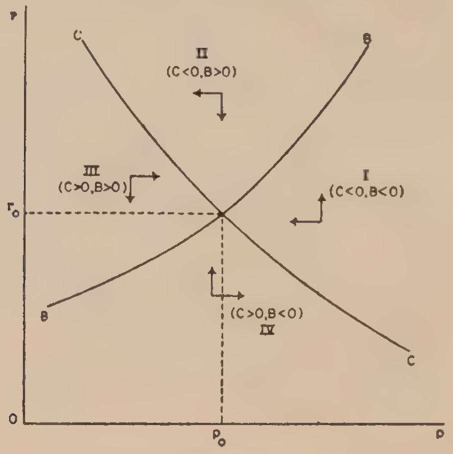

Fig. 1

The answer is that we can—by examining the same budget restraint (5) with the aid of which we established Walras' Law. Remembering that the last parenthetical term in this restraint is zero, let us rewrite this restraint as

(9) $M^d - M_0 = (C^s - C^d) + (B^s - B^d)$,

where $C^s - C^d$ and $B^s - B^d$ represent the money value of the excess supply for commodities and bonds, respectively. Thus equation (9) states that the excess demand for money is necessarily equal to the excess supply of commodities *plus* the excess supply of bonds. We can now see that there are certain areas in Figure 1 through which the equilibrium curve for the money market cannot pass. In particular, the construction of this curve is such that it divides any area through which it passes into two parts : the area to the right, consisting of points representing a state of excess demand in the money market ; and the area to the left, consisting of points representing excess supply. Hence the curve cannot pass through either Sector I or III : For in Sector I there is an excess supply of both commodities and bonds ; and therefore, by equation (9), *every* point in this sector corresponds to a state of excess demand in the money market. Similarly, *every* point in Sector III corresponds to a state of excess supply in the money market. Hence the curve—denoted by MM—must pass through Sectors II and IV.[1]

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[1] *Ibid.*, pp. 177-78.

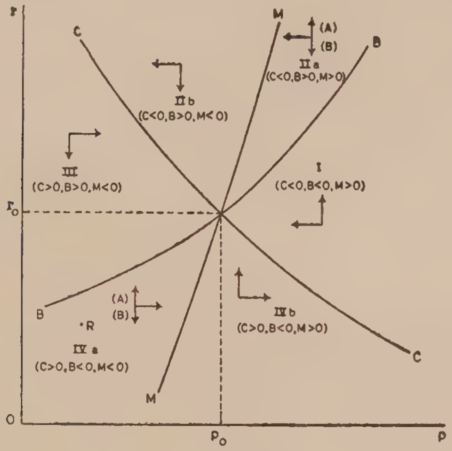

Fig. 2

THE STATE OF EXCESS DEMAND IN THE MONEY MARKET

Sector or curve \ Market	Commodities		Bonds	Money
I	excess supply		excess supply	excess demand
IIa	excess supply	>	excess demand	excess demand
MM	excess supply	=	excess demand	equilibrium
IIb	excess supply	<	excess demand	excess supply
III	excess demand		excess demand	excess supply
IVa	excess demand	>	excess supply	excess supply
MM	excess demand	=	excess supply	equilibrium
IVb	excess demand	<	excess supply	excess demand

This is shown in greater detail in Figure 2 and its accompanying table, where $M<O$ and $M>O$ represent states of excess supply and demand for money, respectively. As just explained, the curve MM must pass through Sectors II and IV, in which there is an excess demand for one of the two goods, commodities and bonds, and an excess supply for the other. In Sector II, for example, there is an excess supply of commodities and an excess demand for bonds. If the former is greater than the latter, then—by equation (9)—there exists an excess demand for money ; this is the situation represented by Sector IIa. If the opposite is true, then there is an excess supply of money—as in Sector IIb. If, finally, the excess supply of commodities exactly offsets the excess demand for bonds, then the excess demand for money is zero ; that is, the money market is in equilibrium. This, of course, is the situation at every point on the curve MM itself. A corresponding analysis can be made for Sector IV.

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[1] I am indebted to my former student Mr. Tsvi Ophir (Goldberger) for pointing this out ; cf. *ibid.*, p. 179, note 7. I am also indebted to him for the observations of the following paragraph.

The contention we will now examine[1] is that the distinction between the liquidity-preference and loanable-funds theory corresponds, respectively, to the distinction between the following two dynamic hypotheses :

(A) When there is an excess supply of *money*, the rate of interest will fall, and when there is an excess demand, it will rise ;

(B) When there is an excess supply of *bonds*, the rate of interest will rise, and when there is an excess demand, it will fall.

Now, there can be no question but that these two statements represent two different theories as to the dynamic behavior of the interest rate. But what must now be emphasized is that this difference does not result from the fact that the propositions refer to two different markets, but from the fact that they imply different dynamic behavior *in the same market*.

This can readily be shown with the aid of Figure 2 and its accompanying table. In every sector except IIa and IVa an excess demand for money is accompanied by an excess supply of bonds and *vice versa*. Hence the direction of the change in interest is the same whether we use Hypothesis (A) or (B). The only difference arises in Sectors IIa and IVa. For example, at point R in the latter, interest will fall according to Hypothesis (A), but will rise according to (B). (This is indicated in the graph by the letters (A) and (B) attached, respectively, to the two vertical and oppositely pointing arrows.) A corresponding statement holds for any point in Sector IIa.

Let us now see what this means. Hypothesis (A) states that an excess supply of money drives interest down in the bond market regardless of the state of excess demand there. Hypothesis (B), on the other hand, implies that the effects of an excess supply of money on interest cannot be determined except by examining the concurrent situation in both the bond and commodity markets. In particular, Hypothesis (B) implies that under certain circumstances (and point R is an example) an excess supply of money may be accompanied by such a large excess demand for commodities that individuals will attempt to finance their additional purchases not only by using up all their excess cash, but also by selling part of their bond holdings. In this way, an excess supply of money might be accompanied by an excess supply of bonds and hence by an increase in the rate of interest.

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[1] Due to Klein, *loc. cit.*, pp. 239-40.

Thus the difference between Hypotheses (A) and (B) results from their differing assumptions as to the implications of an excess supply (or demand) *in the money market.* Correspondingly, this difference would remain even if Hypothesis (B) were replaced—as it can readily be—by an equivalent hypothesis—say, (D)—referring to the money market and postulating explicitly that dynamic behavior for this market which is now implicit in (B). Conversely—and this might be worth noting even if it is a tautology—there would be *no* difference between Hypotheses (B) and (D)—even though the former refers to the bond market and the latter to the money market.

These conclusions can be conveniently restated—in a more rigorous way—in the following symbolical terms : Hypotheses (A) and (B) are represented, respectively, by

$$\text{(A)}\ \frac{dr}{dt} = K_1 (M^d - M_0)$$

and

$$\text{(B)}\ \frac{dr}{dt} = K_2 (B^s - B^d),$$

where $\frac{dr}{dt}$ is the rate of change of the interest rate, K_1 and K_2 are positive constants, and the simplifying assumption is made that the rate of change is proportionate to the amount of excess demand or supply. We also assume that the rate of change of the price level, $\frac{dp}{dt}$, is governed by the state of excess demand in the commodity market, and denote this by Hypothesis

$$\text{(C)}\ \frac{dp}{dt} = K_3 (C^d - C^s).$$

Substituting (B) and (C) into our budget restraint (9) we obtain what we have already denoted as Hypothesis

$$\text{(D)}\ -\frac{1}{K_3}\frac{dp}{dt} + \frac{1}{K_2}\frac{dr}{dt} = M^d - M_0.$$

That is, an excess demand for money affects both the interest rate and the price level. Clearly, the dynamic system corresponding to Hypotheses (A) and (C) differs in general from that corresponding to (B) and (C). On the other hand, systems (B) and (C), (B) and (D), and (C) and (D) are all equivalent—even though they refer to different markets. Thus the markets in which the dynamic analysis is carried out cannot *per se* affect the outcome.[1]

Let us now return to the interpretation of Hypothesis (A) given above and note that it clearly demonstrates its implausibility. For it is difficult to understand why an excess supply of money should drive up the price of bonds even when there exists an excess supply of the latter. But this is precisely what Hypothesis (A) claims to be true for every point in Sector IVa of Figure 2. And a corresponding statement holds—*mutatis mutandis*—for every point in Sector IIa.

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[1] Cf. my *Money, Interest, and Prices*, Mathematical Appendixes, 8 : a-b. The material from this point until the end of the section was somewhat revised after the lecture.

At first sight it might appear that an escape from this implausibility can be achieved by adding to Hypothesis (A) the contention that points such as those described by Sectors IIa and IVa do not exist. In other words, we add to Hypothesis (A) the further Hypothesis:

(E). The excess supply of money is identical with the excess demand for bonds.

It then follows that a point of excess supply (demand) for money is necessarily a point of excess demand (supply) for bonds, and *vice versa*—so that the difficulty described in the preceding paragraph can never arise. In graphical terms, this means that curves MM and BB coincide in Figure 2: for any combination of price and interest which makes the excess demand for bonds zero must do the same for the excess demand for money, and *vice versa*. Thus under Hypothesis (E) Sectors IIa and IVa simply disappear.

But this is to jump from the frying pan into the fire. For Hypothesis (E) really implies that the system is not stable: that the automatic functioning of market forces will not bring it to a determinate position of price and interest equilibrium.

This can readily be shown in the following way. We know—by virtue of Walras' Law—that the analysis of Figure 2 can be carried out in terms of any two of the three markets. Now, there is no reason why the two markets so chosen should not be the bond and money markets. Hence—since we are ignoring the commodity market—Figure 2 reduces to Figure 3—where the single curve represents both

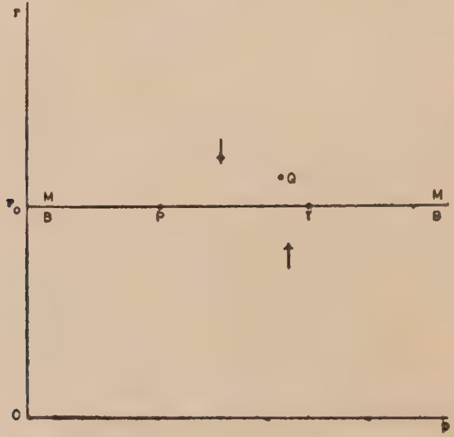

Fig. 3

MM and BB. Assume now that the system is in equilibrium at the point P and that a random disturbance moves it to Q. Clearly, the dynamic pressures which exist in the system (denoted by the arrows) can at best succeed in bringing the system back to the curve BB (or MM)—say, to point T. They cannot assure its return to the original position P. Thus the system is not stable. It is in a state of neutral equilibrium.

This same conclusion can be reached—though in a somewhat more complicated way—even if we carry out the analysis in terms of the commodity and bond (or money) market. First we rewrite our budget restraint (9) as

(10) $C^d - C^s = (M_0 - M^d) - (B^d - B^s)$,

where the first parenthetical term on the right-hand side represents the excess supply of money, and the second term the excess demand for bonds. But by Hypothesis (E) these are always equal. Hence the right-hand side of (9) is identically zero—which means that the excess demand for commodities is zero *no matter what the rate of interest or price level.* Thus under the present assumptions the curve CC of Figure 2 becomes blown up until it comprises the entire area of Figure 3. Correspondingly, the " intersection " of this counterpart of CC with curve BB (or MM) is the latter curve in its entirety. Thus the indeterminacy of the equilibrium position is again demonstrated.[1]

Before concluding this section of the paper it might be well to digress on the relationship between the conclusion just reached and Keynesian monetary theory. In particular, at first sight our conclusion seems to invalidate the familiar contention of many Keynesian economists that an excess supply of money creates a corresponding excess demand for bonds. Actually, however, I do not think that these economists had in mind the troublesome identity described in Hypothesis (E). Instead, all they wanted to assume is that there exists an identity *with respect to certain kinds of changes*. In particular, all they wanted to say is that an excess supply of money *generated by an increase in the quantity of money in the system* is diverted completely to the bond market and is thus identical with the excess demand thereby generated in that market. This is completely different from saying (as is said in Hypothesis (E) and Figure 3) that an excess supply of money *generated by any cause whatsoever* is identical with the excess demand for bonds generated by that cause. Indeed, this latter statement contradicts the fundamental Keynesian assumption that an excess supply of money generated by an increase in the rate of interest will be accompanied by a decreased demand for investment goods—a fact which must necessarily also affect the extent of the excess demand for bonds. Thus under this assumption the excess supply of money could *not* be identical with the excess demand for bonds in the sense of Hypothesis (E).

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[1] Actually, what we have described here is a particular instance of Say's Identity ; cf. *ibid.*, pp. 188-89. From the argument there developed it can also be seen why the curve in Figure 3 must be a horizontal line.

More simply, the aforementioned contention would seem to be intended only as an alternative formulation of the familiar—though usually implicit—Keynesian hypothesis that the real-balance effect manifests itself only in the bond and money markets, but not in the commodity and labor markets. From this it immediately follows that a change in real balances which creates an excess demand in the money market must create an exactly equal excess supply in the bond market. This assumed absence of a real-balance effect in the commodity market may or may not be empirically true : but—unlike Hypothesis (E)—it represents a logically tenable position.[1]

3.[2] All of the preceding argument is based on the validity of Walras' Law. It is also based on the assumption that a state of full employment exists in the economy. What we must now see is whether Walras' Law—and hence the preceding argument—continues to be valid even in the case of involuntary unemployment.

The reason this generalization is not at all self-evident is that Walras' Law relates to an economy in which *all* markets are in equilibrium. In the case of unemployment, on the other hand, there exists a state of excess supply—and hence of continued disequilibrium—in the market for labor. At first sight, then, there would seem to be no place for the operation of Walras' Law.

One way out of this difficulty (there may well be others) is to assume it away by attributing to workers a completely passive behavior pattern according to which they adjust the amount of labor they plan to supply to the amount employers demand at the going wage rate. Hence, by definition, " equilibrium " always exists in the labor market. This behavior pattern is akin to that usually postulated by Keynesian theory,

BUSINESS SECTOR

Planned wage payments ..	N^d	Planned sales to households ..	C^s
Interest payments	R	Planned sales of capital equipment	I^s
Planned dividend payments ..	D	Planned net sales of bonds ..	B^s
Planned purchase of capital equipment	I^d		
Planned addition to cash balances	$\triangle M^b$		
Total planned use of funds ..	T^b	Total planned sources of funds	T^b

HOUSEHOLD SECTOR

Planned purchase of goods and services	C^d	Planned wage receipts	N^d
Planned net purchases of bonds	B^d	Interest receipts .. .	R
Planned addition to cash balances	$\triangle M^h$	Planned dividend receipts ..	D
Total planned use of funds ..	T^h	Total planned sources of funds	T^h

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[1] For a mathematical statement of the distinctions described in these two paragraphs, see the Note at the end of this paper.

[2] This section was omitted from the lecture because of time limitations.

according to which—at the minimum wage rate—workers are willing to offer any amount of employment up to the point of full employment.

This approach actually dodges the real difficulty. Nevertheless, it may be worth while to see how it enables the establishment of Walras' Law. This can be conveniently shown by the use of the preceding simplified " flow of funds " accounts for an economy without a government. These accounts actually represent the budget restraints of the business and household sectors, respectively. By definition, the two sides of each of these accounts must be equal. With the exception of interest payments—which are by definition predetermined—each of the items in these accounts is an *ex ante* one reflecting the plans of individuals. The right-hand side of the household account reflects our assumption that wage earners passively expect to receive whatever employers plan to pay ; hence the term N^d appears there as well as on the left-hand side of the business account. A similar statement holds for dividend payments, D.

If we now add up the two sides of these accounts we obtain

(11) $N^d + R + D + I^d + \triangle M^b = C^s + I^s + B^s$

and

(12) $N^d + R + D = C^d + B^d + \triangle M^h.$

Subtracting (12) from (11) and rearranging terms, we then obtain

(13) $\triangle M^b + \triangle M^h = [(C^s + I^s) - (C^d + I^d)] + [B^s - B^d].$

The first set of brackets on the right-hand side of (13) represents the excess supply in the commodity market ; and the second, the excess supply in the bond market. When equilibrium exists in these two markets, each of these bracketed terms equals zero ; hence the left-hand side of (13)—representing the planned net additions to cash balances—must also be zero. That is, equilibrium must then also exist in the money market. Thus Walras' Law obtains.

The excess supply in the commodity market can be written in a more familiar form if instead of $C^s + I^s$ we write net national product, Y ; and if instead of C^d and I^d we write simply C and I, respectively. The equilibrium condition for the commodity market then becomes the familiar

(14) $C + I = Y,$

where C and I represent the consumption and investment functions, respectively.

Figure 4 provides a graphical illustration of Walras' Law under our present assumptions. Here Y represents real national income, and IS and LL are the familiar Hicksian curves representing those combinations of r and Y at which equilibrium prevails in the commodity and money markets, respectively. The third curve—ZZ—represents the equilibrium conditions of the bond market under certain simplifying assumptions. All three curves are drawn as of a fixed price level and quantity of money. By virtue of Walras' Law, the curve ZZ must pass through the intersection point of IS and LL.

With the aid of Figure 4, we can immediately generalize the arguments of Sections 1 and 2 to the present case too. In particular, all of the interrelationships and dynamic implications of the CC, MM, and BB curves of Figure 2 hold also—*mutatis mutandis*—for the IS, LL, and ZZ curves, respectively, of Figure 4. Correspondingly, the conclusion of Section 2—that the distinction between liquidity-preference and loanable-funds theories can have nothing to do with the distinction between Hypotheses (A) and (B)—holds also for an economy with unemployment. Similarly, Hypothesis (E) would generate the same instability in Figure 4 as in Figure 2: for the LL and ZZ curves would then coincide, while the IS curve would become blown up until it comprised all the points in the diagram.

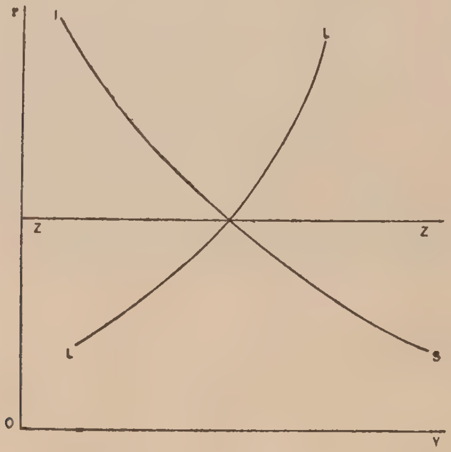

Fig. 4

4. The general argument of this paper can now be summarized as follows: Differences among the various theories of interest there certainly are. But there is no logical possibility of attributing these differences to the different equations selected for analysis, or to the choice of stock versus flow analysis. On the other hand, it may well be that the intellectual processes of those who formulated these theories (and I am thinking particularly of Keynes) were significantly influenced by the fact that they worked in terms of one set of concepts instead of the other. It may well be that, for example, they were able to achieve certain insights from the money equation that they would not have achieved from the bond equation. This is an important and interesting question for the psychology of intellectual processes. But it clearly has no bearing on the fact that it is *logically* possible to deduce these insights equivalently from either equation.

Thus the search for substantive differences among interest theories along these lines is a sterile one. It may well be that the " liquidity preference—loanable funds " controversy was a necessary stage in the working out of new ideas. But we should now recognize it for the confused, transitory stage that it was, and we should accordingly relegate it to that same limbo of intellectual curiosa to which we have already agreed to relegate the even more famous " savings-investment " controversy. Like the latter, it is not a chapter in the recent history of economic doctrine of which we should be particularly proud.

Correspondingly, the substantive differences which do exist among various interest theories must be traced to other causes. For example, the differences may arise from the different periods of time considered by the various analyses. In this connection it might be emphasized—since it has been misunderstood by Keynesians—that a systematic feature of neoclassical interest theory itself is the difference between short-run and long-run analyses. In the former, for example, an increase in the quantity of money will depress the rate of interest, whereas in the latter it will leave interest invariant.[1] Similarly, differences between two theories may flow from the fact that one emphasizes the margin of preference between holding bonds and holding money, while the other neglects this margin. Accordingly, the first theory provides for the permanent effects of shifts in this preference on the rate of interest, while the second does not. This would seem to be one of the fundamental differences between Keynesian and neoclassical theories.

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Note to page 314

The distinction presented in the text can be stated symbolically as follows :

Let the *excess*-demand equations for commodities, bonds, and money be represented, respectively, by

$$(1) \quad \phi\left(Y, r, \frac{M_0}{p}\right) = 0 \qquad \text{commodities,}$$

$$(2) \quad B\left(Y, r, \frac{M_0}{p}\right) = 0 \qquad \text{bonds,}$$

and

$$(3) \quad \psi\left(Y, r, \frac{M_0}{p}\right) = 0 \qquad \text{money.}$$

To state that the excess supply of money *generated by a change in real balances* is identical with the corresponding excess supply of bonds is to state that

$$(4) \quad -\psi_3\left(Y, r, \frac{M_0}{p}\right) \equiv B_3\left(Y, r, \frac{M_0}{p}\right),$$

where the subscript denotes partial differentiation with respect to the third argument, real balances $\left(\frac{M_0}{p}\right)$. To state, on the other hand, that the excess supply of money is identical under all conditions with the excess demand for bonds is to state that

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[1] Cf. *ibid.*, Chapter XV : 1.

$$(5)\quad -\psi\left(Y, r, \frac{M_0}{p}\right) \equiv B\left(Y, r, \frac{M_0}{p}\right),$$

which in turn implies that *all* the partial derivatives are identical : namely, $-\psi_1(\ ) \equiv B_1(\ )$, $-\psi_2(\ ) \equiv B_2(\ )$, and $-\psi_3(\ ) \equiv B_3(\ )$. Thus (5) is a much more restrictive condition than (4).

It should be noted that even if the *demand* function for money is independent of real balances, as is implied by the left-hand side of the familiar Keynesian liquidity-preference function

$$(6)\quad L(Y, r) \equiv \frac{M_0}{p},$$

the *excess*-demand equation,

$$(7)\quad \psi\left(Y, r, \frac{M_0}{p}\right) \equiv L(Y, r) - \frac{M_0}{p}$$

is not : for the effect of real balances enters through the supply side (represented by the right-hand side of equation (6)).

Note too that the budget restraint implies that

$$(8)\quad \phi_3(\ ) + B_3(\ ) + \psi_3(\ ) \equiv 0\ ;$$

that is, any increase in real balances is entirely expended on the goods of the system. It then follows that if equation (4) holds, it must be true that $\phi_3 \equiv 0$: that is, there is no real balance effect in the commodity market. Conversely, if $\phi_3(\ ) \equiv 0$, then equation (8) implies equation (4). Thus the absence of a real-balance effect in the commodity market is equivalent to the identity between the excess demand for money and the excess supply of bonds *for changes generated by the real-balance effect.*

Joseph Lang and Macroeconomics[1]

By R. D. Theocharis

Joseph Lang, an obscure German whose principal work was published in Russia in 1811, is the first real macroeconomic mathematical economist. Kröncke had, before him, defined national income and wealth[2] and Isnard had presented a model of a closed exchange economy,[3] but it was Lang who, not only followed Isnard's lead, but was also able for the first time to create a macroeconomic mathematical model where the problems of distribution, production, money and prices are viewed in their interdependence and the analysis is pursued with consistency and clarity to the ultimate limits the model will allow.

His book bears the title *Grundlinien der politischen Arithmetik*,[4] but his is an entirely novel conception of Political Arithmetic. It is the mathematical part of the Science of Economics[5] and its aim is to search for the *general* relation of interdependence existing among economic quantities. " It abstracts from everything particular and given, and uses Algebra in order to find these general laws ".[6]

Lang must have known the work of Isnard, because his influence is obvious.[7] Like him, he assumes that a portion of the commodity is held by the producer and that only the rest is offered for exchange.[8] Like him, he examines what products each producer gets in exchange for his product. But Lang's model is much more sophisticated, for he has introduced two innovations, both necessary for his later treatment.

The first is that, while Isnard had examined individual commodities, Lang distinguishes three broad classes of goods and introduces aggregation. These are primary products, manufactured goods and services to include those of land, of capital and of the state.[9] According to the product which every individual helps to produce, he is classified in one of these three classes. We thus have the class of primary producers, the " manufacturing class " and the " service class ". It must be stressed that the manufacturing class includes not the capitalists but industrial workers, engineers, management, etc.

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[1] This article is based on part of the material of a thesis submitted to the University of London for the degree of Ph.D. I am indebted to Professor Lionel Robbins for his helpful comments.

[2] Claus Kröncke, *Das Steuerwesen nach seiner Natur und seinen Wirkungen untersucht* (Darmstadt and Giessen), 1804, p. 206.

[3] A. N. Isnard, *Traité des richesses* (London and Lausanne), 1781, Vol. I, pp. 17 *et seq.*

[4] It was published in Kharkov (Charkow) in 1811.

[5] Lang, *op. cit.*, p. ix.

[6] *Ibid.*, p. 54.

[7] For a description of Isnard's views, see H. Reichardt, *Augustin A. Cournot: sein Beitrag zur exakten Wirtschaftswissenschaft*, 1954, pp. 73–75; also R. M. Robertson, " Mathematical Economics before Cournot ", *Journal of Political Economy*, 1949, pp. 523–36.

[8] Isnard had called this surplus " le superflu ", Lang calls it " Balanz ".

[9] Lang, *op. cit.*, pp. 3 *et seq.*

The second innovation is the introduction of money right from the start as an integral part of the analysis. This introduces a complication. Isnard, by working in real terms, was able to write his equations immediately; thus a quantity a of M is exchanged for a quantity bp of M' and cr of M'' and the equation is[1]

$$aM = bpM' + crM''$$

Any saving that the owner of quantity M wants to make has been taken care of, before arriving at a which is the quantity intended for exchange.

But in Lang's model conditions are different. A quantity of, say, a of M is " superfluous " as such, but it is exchanged for money and this is in turn used to buy the other commodities. There is no certainty that the money receipts will be equal to the money payments of an individual or of a class. To ensure this, Lang makes the following assumptions:

(*a*) The quantity of money circulating among the classes is given and does not change.

(*b*) There is no saving of money (hoarding), and no class withdraws any money from circulation. Each class " returns again to the circulation, i.e. to the other two classes, all money which it has received from the other two classes ".[2]

(*c*) No class can give out more money than that received.

(*d*) There are no debts between classes. If a sufficiently long period is taken, debts are cancelled out by repayments.

Having established the equality between money receipts and money payments, Lang proceeds, on much similar lines to Isnard, to examine the interdependence of receipts and payments of the various classes, under a general *ceteris paribus* condition, which includes the composition of each class, the price-level, the quantity of money, etc.[3]

If x, y and z are the total money receipts of the primary producers, of the manufacturing class and of services respectively, we shall have:

(1) $x = a + b$ where a are the receipts from the manufacturing class, and b the receipts from services;

(2) $y = c + d$ where c are the receipts from primary producers and d the receipts from services;

(3) $z = e + f$ where e are the receipts from primary producers, and f the receipts from the manufacturing class.

On the other hand, when x', y' and z' are the respective payments by primary producers, the manufacturing class, and the service class, we shall have:

(4) $x' = c + e$
(5) $y' = a + f$ and
(6) $z' = b + d$

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[1] Isnard, *op. cit.*, Vol. I, pp. 19 *et seq.*

[2] Lang, *op. cit.*, p. 11.

[3] *Ibid.*, pp. 13 *et seq.*

As therefore payments of each class are equal to its receipts, it follows that

(7) $a+b=c+e$

(8) $c+d=a+f$

(9) $e+f=b+d$

Up to this point Lang had considered money as the medium of exchange; but to be able to calculate receipts or payments from the quantities of goods, which each class has available for sale or buys, one needs to know their exchange value in terms of a common measure. This unit of value or accounting unit may be, according to Lang, different from the medium of exchange, and it is in terms of such a unit that receipts and payments must be equal. Lang takes as the unit of exchange value " that quantity of food and other products of nature, which a person belonging to the manufacturing class needs on the average for the satisfaction of his immediate personal wants per year ".[1] This is the unit of value and is equal to one.

If it is assumed that the total population of a country is made up of V persons belonging to the class of primary producers, X belonging to the manufacturing class, and that Y persons offer services, we shall have in total[2]

(10) $A=V+X+Y$

The receipts of the primary producers consist of the value of what they sell to the other two classes. They will therefore consist of X units sold to the manufacturing class, as it is assumed that each member of this class needs a unit of food; of the value of raw materials sold to industry, equal to, say, mX, where m denotes the relation of the value of materials to that of food; and of the value of food sold to the " service class " equal to, say, fY. As he assumes that each member of this last class consumes more than a member of the manufacturing class, he puts $f>1$. Equation (1) above is thus replaced by a new equation for the total receipts of the primary producers:

(11) $B=X+mX+fY$

The receipts of the " service class ", D, are

(12) $D=gB+e\ (X+mX)$

where gB is what the members of this class receive from primary producers, and $e\ (X+mX)$ is what they receive from the manufacturing class.

The receipts of the manufacturing class are

(13) $C=(1-g)\ B+kB$

where $(1-g)\ B$ denotes the receipts from primary producers and kB its receipts from the service class.

In the same way Lang gives the equations for the payments B', D' and C' by the primary producers, the service and the manufacturing classes respectively:

(14) $B'=(1-g)\ B+gB$

(15) $D'=fY+kB$

(16) $C'=(X+mX)+e\ (X+mX)$

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[1] Lang, *op. cit.*, p. 22.

[2] *Ibid.*, pp. 55 *et seq.*

All these results of Lang's[1] we have summarised in the following table:

		Payments to			
		Services	Primary Producers	Manufacturing Class	Total Payments
Payments by	Primary Producers	gB	—	$(1-g)\ B$	$B'=B$
	Manufacturing Class	$e\ (X+mX)$	$X+mX$	—	$C'=(1+e)$ $(1+m)\ X=C$
	Services	—	fY	kB	$D'=fY+kB$ $=D$
	Total Receipts	$D=gB+$ $+e\ (X+mX)$	$B=X+mX+$ fY	$C=(1-g)B+$ $+kB$	—

The requirement is that $B'=B$, $C'=C$ and $D'=D$. There is no need for the receipts of, say, primary producers from services to be equal to their payments. But if a class gives more money to one class, it will give less to the other.[2]

For Lang, B or the receipts of the primary producers is of first importance. It generally increases with the increase in the population of the industrial class or of the owners of services; or when the relation of the exchange value of materials to that of food increases, the population remaining steady, or when the owners of services need more food than they used to need.[3] Given the values of m, f, g, e, and k, the receipts or payments of each class can be calculated.

The gross national product is made up of the sum of the gross products of the three classes. The gross product of the primary producers is made up of: (*a*) the value of the product which is used for reproduction, like seeds, etc.; this is equal to, say, U; (*b*) the value of the product which primary producers keep for their own consumption ; as their needs are assumed to be the same as those of the industrial class, the value of their consumption is equal to V; and (*c*) the value B of their "superfluous" product which they exchange and which was calculated above.

In the same way Lang calculates the total product of the industrial class and for the service class he takes as the value of their services their total receipts. From the gross national income he distinguishes the net national income, which is the remainder after allowance for the depreciation of capital and for double counting has been made.[4] This net income is divided by the population of the country to find the net income *per capita*.[5]

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[1] Lang, *op. cit.*, pp. 55–62.

[2] *Ibid.*, p. 20.

[3] *Ibid.*, p. 62.

[4] *Ibid.*, pp. 66–67.

[5] *Ibid.*, p. 84.

Lang had up to this point treated the unit of value as being separate from the medium of exchange; but now he asks " What is the money *price* of this unit of value ? " To answer Lang seeks to determine the total value of the circulation of goods. This is made up of:

(*a*) *Inter-class circulation.* The value can be found from either the payments or receipts of *all* three classes. Thus for the data presented in the following table, it will be seen that the total value of goods circulating among the classes is $(2+k)\,B$.

		Payments to			
		Primary Producers	Manufacturing Class	Services	Total Payments
Payments by	Primary Producers	—	$(1-g)B$	gB	B
	Manufacturing Class	$(1-g+k)\,B$	—	—	$(1-g+k)\,B$
	Services	$(g-k)\,B$	kB	—	gB
	Total Receipts	B	$(1-g+k)\,B$	gB	$(2+k)\,B$

(*b*) *Intra-class circulation of goods.* A portion of manufactured goods circulates among industrial workers and a portion of primary products circulates among primary producers; but Lang does not think that owners of services have any use for the services of one another.[1] If the value of manufactures thus circulating is μN and that of primary products is πB, we shall have as the total value of goods circulating

(17) $P = (2+k)\ B + \pi B + \mu N$

If x is the money price of the unit of value, Z the quantity of money (coins and credit) which circulates and y is the average velocity of the circulation of money, we shall have[2]

(18) $yZ = Px$ where P has the value given by (17). Equation (18) is the Fisher equation in its most explicit form. From this we get the money price for the unit of value

(19) $x = \dfrac{yZ}{P}$

" What therefore an increase in the quantity of money or the velocity of circulation does, when the real value of goods is not increased simultaneously, is to cause an increased money price of the unit of value and an increase of all money prices, in so far as they are determined by the money price of the unit of value."[3]

[1] Lang, *op. cit.*, p. 116.
[2] *Ibid.*, p. 117.
[3] *Ibid.*, p. 119.

If both the quantity of money and its velocity are constant, x and P are inversely related. Thus if P' is the new total value of commodities circulating and x' the new price, we shall have[1] $P'x'=Px$ or $P':P::x:x'$. This result was for the first time in the history of mathematical economics written by Lang by using the finite difference notation. Thus given $P'x'=Px$, if $x>x'$, $P'>P$ and $x'=x-\triangle x$ and $P'=P+\triangle P$, we shall have

$$(20)\quad \triangle P=\frac{P\triangle x}{x-\triangle x}$$

If the quantity of money is increased by $\triangle Z$ and " if all the other relations remain the same as they used to be, only the money price of the unit of value rises "[2], and as

$$y(Z+\triangle Z)=P(x+\triangle x), \text{ it follows that}$$
$$y\triangle Z=P\triangle x$$

and (21) $\triangle x=\frac{y}{P}\triangle Z$ which is directly comparable with (19). This is the clearest possible formulation of the quantity theory.

We have already seen that Lang had assumed that primary producers gave to " services " a portion g of the value of their " superfluous products " B, in payment of rent, interest and taxes. If the price of the unit of value is x, gB has a " money value " gBx. He now assumes that for some reason the contributions of producers to services increase in *money terms* by an amount a and seeks to examine what will happen on the assumption that B will remain unchanged.[3]

According to Lang there are three possibilities:

(*a*) The money price x changes, while the contribution in real terms remains unchanged. Then

(22) $gB(x+\triangle x)=gBx+a$, and the change in the price of money is

$$(22a)\quad \triangle x=\frac{a}{gB}$$

(*b*) The price x may remain unchanged, and primary producers will have to make up for the increased contribution by increasing the portion g of their total amount of available goods B. Then

(23) $(g+\triangle g)Bx=gBx+a$, and the increase in real terms against the primary producers is

$$(23a)\quad \triangle g=\frac{a}{Bx}$$

(*c*) It is, however, more plausible that both the price x and g will change. Then

(24) $(g+\triangle g)B(x+\triangle x)=gBx+a$

from which Lang arrives at

$$(24a)\quad \triangle x=\frac{\lambda-x\triangle g}{g+\triangle g}\text{ where } \lambda=\frac{a}{B}$$

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[1] Lang, *op. cit.*, p. 172.
[2] *Ibid.*, p. 185.
[3] *Ibid.*, pp. 173–177.

and $\lambda > x \triangle g$, as by definition x increases together with g. It may be noticed immediately that the greater $\triangle g$ becomes, the smaller $\triangle x$. When $\triangle g = \frac{\lambda}{x}$, $\triangle x$ will be zero. On the other hand, when $\triangle g = 0$, $\triangle x$ becomes a maximum equal to $\frac{\lambda}{g} = \frac{a}{gB}$, as in the first case.

This is a very broad outline of Lang's contribution to economic analysis. He has also many interesting things to say about the effects of a change in the quantity of money on the receipts and payments of each of his classes, since such a change creates a disequilibrium which must be adjusted. He also examines the effects of a change in the population on the composition of his classes and on his system in general.

Lang's work is entirely unknown. The only one to attempt even a very cursory review of his work is R. M. Robertson, who accuses him of insisting on classifying the population of a country illogically into those engaged in agriculture, those engaged in manufacture, and " officials ".[1]

The London School of Economics.

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[1] R. M. Robertson, " Mathematical Economics before Cournot ", *Journal of Political Economy*, 1949, p. 534. Lang's work is mentioned in both Fisher's and Jevons's bibliographies on mathematical economics.

The Exchange Business of the Irish Banks in the Eighteenth Century[1]

By L. M. CULLEN

Throughout the eighteenth century, Ireland was a peasant economy producing for export beef and dairy produce together with an increasing amount of linen cloth. With the passing of the English protectionist Cattle Acts of the 1660's, France and the foreign and English islands of the West Indies became the main outlet for Irish agricultural produce until about the middle of the eighteenth century, although exports of wool, woollen yarn and tallow to England remained at all times substantial. Despite this protectionism, however, England re-established itself after 1689 as Ireland's major foreign market, largely because of the Irish tariff system which favoured Anglo-Irish commerce above all others, and the growth of the linen trade. After 1758, the hegemony of the English market was further strengthened by the re-admittance of Irish pastoral products. The vicissitudes which characterised Irish exports to England were not, on the other hand, paralleled in the Irish imports from across the Irish Sea. Dublin and Cork were the main centres through which this trade was transacted, and though Belfast was a growing centre, it was dependent on Dublin as a point of shipment in the first half of the century and then, as later, for much of its foreign exchange business. The movements of commodity trade in this period were on the whole favourable to Ireland. Even the initial impulse of the Industrial Revolution was felt more as a demand for food for the growing industrial masses of England than as a herald of doom for Ireland's nascent and modest industry. Despite the sharp rise in population, and the country's grievous social and agrarian sores, it seems certain that there was some increase of prosperity in Ireland in the last four decades of the eighteenth century. There was, however, apart from the larger seaport towns, little urban development, the middle class remained small and the gentry largely absentee.

In these circumstances, it is highly probable that the bulk of inland transactions was effected by cash of one kind or another; and in the early part of the period the inland remission of funds presented grave difficulties. This arose from the relatively underdeveloped nature of the economy which provided scant opportunity for a widespread growth of specialised financial institutions. In the seventeenth century there were no banks in Dublin apart from a few which specialised in mortgages on land. In the provinces there was only a bank of sorts, conducted by the Cork merchants Edward and Joseph Hoare, whose overseas trade at the end of the century enabled them to draw bills on merchants in Bristol and London and on the Commissioners for Victualling the Navy. But generally recourse was always had to merchants who were only prepared to draw on London as the course of trade enabled them to do so. In Dublin, as the chief centre of Irish trade, there was, however, already a class of " exchangers ", loosely described as bankers, in the business between Ireland and London. It was around this foreign exchange activity that, in contrast to the position in England, Irish banking developed.

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[1] I am indebted to Drs. A. H. John and D. C. Coleman of The London School of Economics for criticism and advice in the preparation of this article.

As a consequence, most of the early banks were mercantile in origin. Such, for example, was the famous Dublin private bank of La Touche. David Digues La Touche established a silk, poplin and cambrick manufactory in Dublin at the end of the seventeenth century and also acted as a Dublin agent for many of the Huguenot manufacturers in the Irish provinces. It was thus but a small step forward to undertake the regular remission of funds between Dublin and various Irish provincial centres. Nor is it surprising that when the bank was established on a formal basis, the names of several of its correspondents were French : Vashon and Son in Waterford, Alexander Crommelin in Lisburn, William Crommelin in Kilkenny, Solomon Le Blanc in Lurgan. Once engaged in the internal remission of funds, La Touche was led as a matter of course into the remission of money to London. As several of La Touche's correspondents belonged to the Crommelin family, the founders of the Irish linen industry, it may not be altogether fanciful to surmise that La Touche's foreign exchange had its origins in discounting bills drawn by linen drapers and shippers. Certainly, La Touche's English correspondents were in London, Chester and Bristol, the three points of entry for the bulk of the Irish linen exports, and his sole continental correspondent was in Holland, from whence part of Ireland's supply of flax-seed came. Similar examples in the rise of Dublin banking are the bank of Dillon founded by a merchant family trading with Holland and France, and having members of the family established in Rotterdam and London; and the bankers James Swift, Thomas Gleadowe, Richard Dawson, William Lennox, John Macarell and Thomas Finlay.

The mercantile origins of the provincial banks are no less striking. With perhaps one or two exceptions, they were all established by merchants and remained subsidiary in many cases to the trading activities of their founders. Apart from merchants who opened banking houses, there were others who, like Edward and Richard Weekes, merchants in Waterford, might issue promissory notes payable not as bankers' notes to bearer but to " persons or their orders ". As these notes circulated[1] it is obvious that the line dividing merchant and banker was tenuous. An Act of Parliament passed in 1756, shortly after the failure of three Dublin banks closely identified with the merchant community, prohibited bankers from engaging in trade as merchants[1]: but loose in wording, it was ineffective in practice, because merchants could still issue notes, without assuming the formal status of bankers.

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[1] *Journals of the Irish House of Commons*, Vol. IV, App. CXXII, 29 February, 1739–40.

The rapid growth of banking in the eighteenth century was partly in response to the development of trade and partly to the acute shortage of coin which made bankers more capable of forcing their notes on the community which, in turn, was ready to accept them in the place of the medley of worn or underweight English and foreign gold. From the start, exchange became their most important function. Dublin's first regular bank, that of Burton, embarked from its foundation on the discounting business, and as early as 1696 Sir John Lowther, writing from London, informed the agent of his collieries in Whitehaven that, " if any money could be returned out of Ireland there is one Burton at Dublin which makes ye most returns and his correspondent here is one Haistwell of my acquaintance ".[2] Many other Dublin banks were to follow. A few were destined to have a long life, but many were ephemeral. Their pattern of business was, however, alike in all cases, and as London was the centre through which the greater part of Irish commercial finance was transacted, all had agents in the English capital. Thus, in their first year, Messrs. Swift & Co. spent £100 in " charges in sending a person to London and [to] sundry persons in Ireland to fix upon proper persons for correspondents for the company ".[3] The amount of commission paid by them in that year to their correspondents for bills of exchange negotiated was considerable, being £672 9s. 7¼d. It was far and away their greatest charge, amounting to 40 per cent. of their total expenses. La Touche and Kane's banking followed a similar pattern. They had correspondents not only in the principal towns of Ireland but also in Bristol, Chester and London; in whose hands were funds enabling La Touche and Kane to draw bills for their Irish customers.[4] These balances must have originated in bills discounted by the bank and paid for by their own note issue, and the bills when honoured increased the funds in the hands of their correspondents in London and elsewhere. By keeping their discounting and drawing of bills at a fairly even rate, they maintained their London balances at a steady level, and a pamphlet of 1729 suggests that the varying of the exchange with this object in view was already a normal procedure among Irish bankers.[5]

The reasons for the prominence of exchange dealings in the business of the Irish bankers arose primarily from the pattern of Irish commodity trade. The balance appears to have been highly favourable under normal conditions, which meant that it was not always easy for a merchant to find a ready purchaser for a bill drawn on London. There was, of course, a large body of temporary or permanent Irish absentees, requiring the remission of their rents to London, but direct dealing between an absentee's agent and merchant was difficult. The merchant might not be in a position to draw at any time or for the amount the remitter might require. This provided the opportunity for the bankers. By taking bills from all merchants and at all times, it was possible for the banker to meet all requirements on him for remitting funds to London. To an increasing extent throughout the first half of the century, merchants seem to have discounted their bills with the banks rather than among their fellow-merchants, and remitters to London increasingly relied on bankers' bills.

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[1] 29 Geo. II, c. 16 (Ir.).

[2] Lowther Estate Office, Somerset House, Whitehaven. Sir John Lowther's Letters to his agent at Whitehaven, London, 14 July 1696 (no. 19). These letters have since been transferred to Lowther, near Penrith, prior to dispersal.

[3] J. Busteed: " Irish Private Banks ", *Journal of the Cork Historical and Archæological Society*, Vol. 53 (1948), p. 33.

[4] An abstract ledger of the firm for the years 1719–26 survives, of which there is a photostat copy in the National Library, Dublin, MS.2785.

[5] *Observations on coin in general*, Dublin, 1729, pp. 38–9.

The abstract ledger of La Touche and Kane which survives[1] throws some light on Irish banking of the early eighteenth century. Their business relates practically exclusively to the internal or external exchange of money, and of the quarterly balances in the hands of their correspondents those in England invariably form between 40 and 70 per cent. Their principal business was with London where they had two well known correspondents, Jonathan Gurnell & Company and John Puget, and intermittent dealings with Edward Flower & Son and Ellijad Edward. The balances in the hands of La Touche's agents there were far greater than those either in Bristol and Chester or in their largest provincial centre in Ireland. The size of the bank's English balances increased steadily over the years 1719–26. The following table reproduces a summary of their October-December balances, normally the largest of the year.

BANK OF LA TOUCHE & KANE

Oct. 1—Dec. 31	" Abstracts of accounts as they stand: places and correspondents' names: cash in their hands "				
	London		Bristol	Chester	Total
	English a/c	Dutch a/c			
1719 ..	3,868–7–5¾	—	—	108–19–5¾	3,977–6–11½
1722 ..	5,267–1–7	27–0–0	567–16–2	271–8–0	6,133–5–2
1723 ..	5,047–5–3¼	185–15–0	728–5–7	247–10–11¼	6,208–16–9½
1724 ..	8,697–13–0	740–0–0	954–8–4½	204–5–10	10,596–7–2½
1725 ..	9,642–0–0	870–0–0	1,201–14–9	1,722–0–0	13,435–14–9

These sums indicate a rather large business, and assuming that all bills were at 21 days' sight, as was the practice in Anglo-Irish payments, their turnover must have been substantially greater than the actual balances in the hands of their correspondents at the end of the quarter. The drawings on the bank's resources were severest in the first half of the year, but as one would expect from the nature of the Irish

[1] See p. 328, n.4.

economy, they were always able to increase their balances in the second half, when their discounting was most active.

CASH IN THE HANDS OF LA TOUCHE'S ENGLISH CORRESPONDENTS

Year	1 Jan.–31 Mar.	1 Apr.–30 June	1 July–30 Sept.	1 Oct.–31 Dec.
1719 ..	—	—	—	3,977–6–11½
1720 ..	3,627–14–2½	5,920–0–7	—	—
1721 ..	4,171–10–0¼	2,357–0–0	5,461–10–9¼	—
1722 ..	—	—	5,433–3–6½	6,133–5–2
1723 ..	3,177–0–11½	4,205–9–1	3,573–17–4	6,208–16–9½
1724 ..	5,715–1–3½	6,048–1–1	7,319–5–4	10,596–7–2½
1725 ..	5,211–9–0¾	7,166–7–7½	13,074–11–3	13,435–14–9
1726 ..	12,597–6–5	—	—	—

By the early 'thirties there were as many as six or seven banks in Dublin, and the growth in their number and volume of business is to be associated with the high exchange of the 'twenties. This high exchange led to a disappearance of most of the exportable specie; and thus the greater demand for, than supply of, bills was an important factor in forcing many remitters to have recourse to the bankers.

A sure sign of the progress of Dublin banking is that the bankers were now remitting government money to England. The sums involved in official transfers were too large for merchants to handle and for that reason recourse was had in the seventeenth century to London goldsmiths to effect these transactions. The growth of banking in Ireland, however, meant that there were now individuals in Dublin with sufficient resources to remit large sums. In 1730, for example, £40,000 was paid to the bankers Henry and Burton to remit to England.[1]

Another proof of the prominence which the bankers of the 'twenties were acquiring in exchange is that they were able to charge a rate for their bill-drawings which was about 1 per cent. higher than that charged by merchants. This suggests that merchants' bills were becoming relatively few in Dublin compared with demand, partly as a result of the increased tendency of merchants to pass their bills to the bankers, and that the bankers were therefore in a position normally to force a higher rate for the bills they drew. In 1726, for instance, a land agent promised to remit a sum of money to an absentee "at the easiest and surest terms I can and to be sure it will be at least 1¼ per cent. less than from the bankers ".[2] The Dublin banker Henry was described as " one of the dearest in town, always 1 per cent. dearer than one could get good merchants' bills ".[3]

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[1] Public Record Office of Northern Ireland, Belfast. Transcripts of the State Papers, Ireland, T.693, p. 1 (Jan. 2, 1729/30). See also F. G. Hall, *The Bank of Ireland, 1783–1946*, Dublin and London, 1949, pp. 7–8.

[2] P.R.O. C.110/46, bundle I, no. 71. Owen Gallagher to Oliver St. George in London, Dublin, 4 Jan. 1727.

[3] *Ibid.*, bundle I, no. 47, Owen Gallagher, 14 Jan. 1726.

Bankers were able to draw so freely only as a result of the large numbers of bills which they discounted and which, being at very short sight, meant that a perpetual stream of funds was becoming available to them in London. As merchants' drawings were largely to the order of remitters, the bankers were the sole persons to charge a regular discount; and in 1727 the agent, Owen Gallagher, informed his landlord that the reasons why bankers took bills at " a quarter or half per cent. less [exchange] than others is that they take bills every post from such as have bills to pass, and others take bills but now and then, as their occasions require ".[1]

Bankers' rates being high, remitters who had the necessary acquaintance among merchants and who were not under immediate pressure to remit, often sought merchants who were in a position to draw. Where an absentee or agent was likely to have frequent sums remitted, and a merchant had funds regularly accruing to him in London, an agreement between the two parties was at times possible. The merchant then drew bills at a fixed and lower rate than the current course of exchange in return for cash regularly placed at his disposal.

Less important, but still very significant, was the inland exchange business. Swift's bank in its first year appointed country correspondents, and over the eight years 1719–26, La Touche and Kane had 19 correspondents in 15 provincial centres. Their dealings with Cork and Limerick were by far the most important, and there was apparently a separate course of exchange on each of these centres. Dealings with agents in other centres were much smaller and appear to have been effected under a single course of " country exchange ". The more important towns comprising this country exchange were, in rough order, Clonmel, Galway, Waterford, Belfast, Kilkenny, Sligo, and there were smaller and more intermittent dealings with agents in Londonderry, Youghal, Lisburn, Lurgan, Carlow, Drogheda and Birr. These correspondents were, in most cases, and perhaps in all, merchants and manufacturers, some of whom were eventually to enter banking on their own account. Thus, John Bagwell was a merchant in Clonmel, and was the founder of a well known local bank. Caleb Falkiner, merchant of Cork, was the father of Riggs Falkiner, merchant, who opened Falkiner's bank in Cork before 1760; and the Boyle, who as partner with Lenox, was another of La Touche's Cork correspondents, is almost certainly of the firm of Boyle, Calwell and Barrett, merchants in the provision trade and embryonic bankers. Again, the names of La Touche's Waterford correspondents, Newport and Knuckle, suggest the origins of the Waterford bank of Newport. From the early decades of the century, the existence of the Dublin and provincial agents contributed to the ease of internal exchange, as was the case in a rather similar manner in England. As the provincial banks became more numerous after the middle of the century, and generally selected a Dublin private bank as one of their correspondents, it is easy to understand how the passing of the century witnessed a growing ease of internal remittance.

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[1] *Ibid.*, bundle I, no. 74, Owen Gallagher, 30 Jan. 1727.

Some contemporaries writing after the crash of the bank of Malone, Clements and Gore in 1758, were led to believe that the main business of Irish banking was lending on mortgages,[1] and later writers have been misled into following the same beliefs by applying to the bankers of the period in general the terms of two subsequent Acts of Parliament.[2] There is, however, not the slightest evidence to substantiate this view, and it is certainly one which was not held by most contemporaries. Early eighteenth-century pamphleteers accused the banks, because of their interest in exchange, of having wilfully exported the country's supply of silver and English gold. At a still later date, a hostile critic claimed that the banks had wrested the business of exchange from the merchants,[3] and a writer in 1780 stated that " the principal object of the banking trade in Ireland is the business of discounting ".[4] Indeed, the Bank of Ireland itself was in the early years of its existence primarily a discounting bank.[5]

The real weakness of the Irish banks arose from the general shortage of specie which, as all the Irish banks were committed to exchange dealings, made them extremely vulnerable during a period of high exchange rates. The supply already scarce in 1660 was reduced still further as a result of the unfavourable rates of exchange in the decades following the Cattle Acts of the 1660's. At the opening of the eighteenth century it was even found necessary to enlarge by Act of Parliament the time for purchasers of forfeited estates in Ireland to make payment of the purchase price, because immediate payment had ceased to be possible on account of the want of money.[6] Though the coinage appears to have increased in the early years of the century, mainly as a result of a favourable balance of payments over the years 1706–15, the increase barely corresponded to the growth of domestic and external trade.[7] Cash remained acutely scarce, especially silver, and in some cases tenants were unable to pay their rents through sheer scarcity of coin. In the poor trading conditions of the 'twenties, worsened by bad harvests and at times famine conditions, exchange became unfavourable to Ireland, even allowing for the fact that the bulk of the coinage now consisted of overvalued foreign gold. There was thus a strong demand for specie to remit abroad, which imposed a great strain on the banks. They were, therefore, ill prepared to meet a run by holders of their notes. The fact that notes continued in circulation and that only two important banks succumbed to " runs ", may perhaps be attributed to the replacing of guineas and silver by overvalued foreign gold. This now formed the mainstay of the Irish circulation, and its cost of transfer would have equalled the high cost of bills.

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[1] *Considerations on the present calamities of this Kingdom and the causes of the decay of Public Credit*, Dublin, 1760, p. 4.

[2] 33 Geo. II, c. 4, c. 14 (Ir.).

[3] *Observations on and a Short History of Irish Banks and Bankers*, Dublin, 1760, pp. 8–9.

[4] *A View of the Present State of Ireland*, London 1780, p. 91.

[5] Hall, *op. cit.*, pp. 50–53.

[6] 2 & 3 Anne, c. 19 referred to in *Calendar of Treasury Books*, Vol. 27, p. 46n.

[7] A writer in 1698 estimated the Irish coinage never to have exceeded £300,000 (*Some thoughts on the Bill depending before the . . . House of Lords for prohibiting the exportation of the woollen manufactures of Ireland to foreign parts*, London, 1698, p. 5), but Irish writers of the 'twenties and 'thirties estimated the coinage at various totals between £400,000 and £600,000. See also Hist. Mss. Cmmn., *Diary of the First Earl of Egmont*, Vol. 3, p. 329.

Favourable conditions returned in the 'thirties and the devaluing of the foreign gold in 1737 brought the exchange below par. This encouraged the inflow of guineas though, as silver continued underrated, the scarcity of the smaller coins remained. Exchange remained favourable for the next 15 years, and during this period, with a probable inflow of gold, no difficulties were encountered by the bankers, apart from a run due to political causes in 1745. After the Peace of 1748, however, imports increased sharply and reached a climax in 1753 and 1754. The balance of trade itself did not become unfavourable, but as the volume of remittances to absentees was a constant factor, or in years of increased exports, a rising one, exchange now became unfavourable. This led to a demand for guineas to remit, and the bankers were again in difficulties. A pamphleteer, writing in 1760, six years after the failure of Dillons' bank, declared that £300,000 in guineas, which they had imported in two years, had been exported as fast.[1] But Dillons' circumstances were exceptional as the holders of the bank's notes had become aware of the financial difficulties of the bank's foreign correspondents and partners in trade. However, all the Irish banks were affected by a general shortage of cash. This was due in part to the stop put, in 1751, to the currency of the Spanish pistoles which, as they had been slightly overvalued in the proclamation of 1737, now formed a large part, and perhaps the bulk, of the Irish coinage. The shortage was further aggravated by the rise in the rates of exchange,[2] and by the fact that the Portuguese gold reduced in 1737 was much more readily exportable. The want of cash was acutely felt in the country, and as the balance of payments deteriorated, pressure to remit forced exchange in the absence of a sufficient stock of specie to a high level; " but even at that rate bills are very scarce and 10 per cent. has this day been given; this proceeds from ye great scarcity of money among us ".[3] It is not surprising that the Dillons failed at this juncture. Their collapse made the task of the other banks more difficult, and in March 1755, the banks of Willcocks & Dawson and Lennox &

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[1] *Letter to the Author of a pamphlet entitled Some Thoughts on the Nature of Paper Credit*, Dublin, 1760, p. 18.

[2] The 1804 Currency Committee, mistakenly, accepted the rise of exchange in these years as a result of an over-issue of bank paper. (*Report of the Committee of the House of Commons on the circulating paper, the specie, and the current coin of Ireland*, 1804, reprinted 1826, p. 7). But its opinion was based solely on the evidence of William Colville, who gave a confused and inaccurate account of what he remembered of events 50 years previously (*ibid.*, pp. 121–2).

[3] Guildhall Library, Radcliffe Papers, MS.6645/5, Francis Thomé, Dublin, 28 Feb., 1754.

French succumbed. The merchants agreed to accept the notes of the remaining banks and this succeeded in tiding them over their difficulties. But in 1759–60 exchange rose above par again amid a shortage of coin, and two further banks collapsed. Later, in 1770, in somewhat similar conditions, there was a very severe run on the banks.

The shortage of money would, under any circumstances, have made banking perilous in Ireland, but it was the bankers' interest in exchange which made them most vulnerable. Under unfavourable external payment conditions the bankers had to protect themselves by charging a higher exchange on their bills on London, but this increase itself encouraged the cashing of bankers' notes by private individuals now more anxious than ever to remit specie on their own account to avoid the loss on bankers' bills. Almost all the Irish banks which collapsed did so in periods of high exchange, when specie was short, the only clear exception being the bank of Malone, Clements & Gore. During the last 30 years of the century the balance of payments was definitely favourable and the ensuing low exchange led to the inflow of gold, often in large quantites. With a growing stock of gold in the country, the banks were free from danger and more able to survive by lessening their discounting of bills in time of commercial or political crisis.

The shortage of cash had already as early as the 'twenties[1] led to a great use of notes issued by the banks principally in return for the bills they discounted. La Touche & Kane, for instance, increased their note issue from £44,489 in the October–December quarter of 1719 to £63,482 in the same quarter of 1725. The following table reproduces their note issue for those quarters for which figures are available:

	1719	1720	1721	1722	1723	1724	1725
	£	£	£	£	£	£	£
Jan.–Mar. ..	—	39,352	19,669	32,581*	47,860	51,649	53,634
April–June ..	33,979	37,337	26,784	—	52,528	57,515	62,946
July–Sept. ..		—	23,712	37,545	56,085	48,690	55,365
Oct.–Dec. ..	44,489	—	—	—	—	45,795	63,482

* 1 Oct., 1721–1 April, 1722.

The security for their outstanding notes lay in cash, in other bankers' notes and in bills discounted. Cash in hand and other bankers' notes taken together formed a fairly stable ratio of about 30 per cent. to their liabilities. However, though the total percentage of cash and bankers' notes remained steady, the proportion contributed individually by the two items followed a sharply contrasting trend. Their cash in reserve, which amounted to as much as £20,000 to £34,000 quarterly in the years 1719 and 1721, had in 1725 dwindled to £7,000, whereas on the other hand, bankers' notes grew from £1,262 in the quarter 1 January, 1721—31 March, 1721, the first quarter in which this item is indicated, to £22,946 in the same quarter of 1725, and to £30,991 in the next quarter (1 April—last June 1725). This is a reflection of the acute scarcity of money in Ireland, and of the increasing circulation of bankers' notes in Dublin. By the first quarter of 1725, La Touche & Kane eliminated their liabilities other than that to their note issue. This had the effect of reducing the amount of their outstanding commitments, raising the proportion of cash and other bankers' notes to between 40 and 60 per cent. of their assets. The items eliminated included acceptances and some commitments of a relatively long-term nature. The fact that banking profits were buoyant suggests that La Touche & Kane were concentrating on the more liquid and more profitable bill trade.

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[1] "Were it not for bankers' notes which we have been passing in good plenty, it would be impossible to manage our domestick traffic half so well as we do." (*Observations on Coin in General*, Dublin, 1729, p. 45. Cf. Berkeley, *The Querist*, 1735 (Dublin, 1935, ed. J. Hone), Part I, no. 35).

BANKING PROFITS

Year ending 31 March	La Touche & Kane[1]	James Swift & Co.[2]
	£	£
1720	1,215–6–11	—
1721	898–13–10¼	—
1722	1,330–3–0¾	—
1723	1,270–13–7¼	947–16–1
1724	1,553–0–2¼	1,980–11–9
1725	1,922–2–3¼	1,412–6–11
1726	1,711–19–7½	—

The growth in the number of issuing banks led to an expanded note issue, and the import " boom " from 1749 onwards witnessed an increased use of paper pumped into circulation in the discounting of merchants' bills.[3] The subsequent failures produced a painful contraction of credit which was a cause of Parliamentary concern. Though the Irish circulation gradually recovered in the following decades, the provincial note issue with banks in only three or four towns other than Cork must have remained relatively insignificant, and in Dublin itself the private banks can at best have barely regained by 1797 their circulation of the 'fifties.[4] In part this resulted from

[1] National Library, Dublin, MS.2785. Abstract Ledger of La Touche & Kane.

[2] J. Busteed, " Irish Private Banks," *Journal of the Cork Historical and Archæological Society*, vol. 53, pp. 33–4.

[3] The total in circulation may have reached £1 million. This was not in itself excessive considering that the bankers' circulation in Ireland had been estimated at the modest total of £400,000 in 1729 (*Scheme of the Money Matters of Ireland*, Dublin 1729, p. 17), but it greatly exceeded the capital of the banks issuing it. (*Journals of the Irish House of Commons*, Vol. V, p. 378.)

[4] A writer in 1762 stated that the circulation of the Irish banks prior to the many failures was above £1,000,000 and that it was now " eclipsed " through the banks being in disrepute (*Some Hints on Trade, Money and Credit, Humbly Addressed to the True Friends of Ireland*, by Arthur Jones Nevill, Dublin, 1762, pp. 21–3). The note issue of the Dublin private banks in 1797 was estimated at £700,000 (*Report of the Committee of the House of Commons on the circulating paper, the specie, and the current coin of Ireland*, 1804, reprinted 1826, p. 9).

the founding of the Bank of Ireland, which in 1797 had a paper issue equal to that of all the Dublin private banks combined; in part from the steady inflow of specie under a favourable course of exchange both on private account and for the account of the Bank of Ireland.[1] Because the Irish banks were primarily discounting houses, the issue of notes was, in a sense, only incidental and had been adopted by the want of specie. Even allowing for some development of provincial banking in the second half of the century, and for the additional accommodation provided by the Bank of Ireland, itself a bank of moderate size and confined in the main to the Dublin area, the discounting facilities made available by the banks were failing to keep up with the growth of internal and external trade. This gave rise in the second half of the century to a class of merchants with a specialised bill trade. Their functions were similar to those of the Irish banks, the only real difference being that they did not issue notes in discounting, largely because of an enlarged supply of gold coins. In an enquiry before the House of Commons in 1772 into the bankruptcy of William Howard, a wine importer, for instance, a witness stated that Howard had " set up the bill trade, that is to say, that he had become an acceptor and discounter of bills, and that country gentlemen lodged their money with him ".[2] One landlord, Pollard of Castle Pollard in Co. Westmeath, had since 1767 been in the habit of paying his rents into Howard's hands, and drawing on him as often as he required. Howard was frequently in advance of receipts from Pollard, and at times when there was pressure on Howard himself, he drew on Pollard in London.[3] These bill merchants also tended to support one another, because following different trades, one might have resources free while another was actually under pressure. They also had recourse to the banks. Abraham Grier, for example, drew on the bank of Colebrook to the amount of £50,000 a year, and owed £4,000 at the time of Howard's failure.[4]

From the beginning of the century onwards, provincial merchants had begun to have enlarged financial and commercial dealings with Dublin correspondents. This gave rise to an increased circulation of inland bills of exchange, and some of the Dublin merchants who acted as correspondents gradually developed a bill business to meet the various requirements of internal payments, as well as of external exchange. In 1770 the Cork merchant, Richard Pope, employed the bank of Thomas Finlay & Company as his Dublin correspondents, but had also some financial dealings with the Dublin firm of Williams & Sadleir, with whom " I do all my merchandise business . . . and some bill business ".[1] The large Dublin merchant house of Joshua & Joseph Pim discounted bills on a very extensive scale. In the 'nineties they were discounting bills on English merchants for Courtenay & Ridgway, provision merchants in Waterford, and accepting drawings on them by butter merchants in the river valleys converging on Waterford, from whom Courtenay and Ridgway purchased corn and butter. Their discounting for Courtenay & Ridgway in 1792 amounted to almost £43,000 and when drawings on them tended to be in advance of bills discounted, they drew on, or had sums remitted from, one or other of two London discount houses who also operated for Courtenay & Ridgway.[2]

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[1] The supply of specie in Ireland in 1774 was put at £1,500,000 by one writer (*Thoughts on a Fund for the Improvement of Credit in Great Britain and the Establishment of a National Bank in Ireland*, London, 1780, p. 24), a figure which represents a great increase on previous estimates. There is evidence of a strong inflow of specie in the following decades and the supply in 1797 was computed at £5,000,000 (*Report of the Committee of the House of Commons on the circulating paper, the specie, and the current coin of Ireland*, 1804, reprinted 1826, p. 86). An important contributory factor was the removal of the prohibition on the export of guineas to Ireland in 1780. Hitherto, guineas could be shipped to Ireland only by stealth.

[2] Report on the Bankruptcy of William Howard, 20 March 1772. *Journals of the Irish House of Commons*, Vol. VIII, app. CCCCLXV.

[3] *Ibid.*, app. CCCCLXVII. Some idea of the extent of Howard's bill trade can be obtained from the evidence given by Patrick Ferril, book-keeper to the partnership of William and John Howard, before the parliamentary committee. According to the committee's summary of Ferril's evidence, Howard's receipts over the period 1 June–15 Nov., 1770, the latter the date of his bankruptcy, were £34,678 and his disbursements from notes and bills accepted in the same time, £60,513 (*Ibid.*, app. CCCCLXXI).

[4] *Ibid.*, app. CCCCLXXII.

The Dublin firm of Robert Shaw & Son had a country-wide business, dealt with large provincial firms and country bill merchants, and even acted as a correspondent for two banks in Cork, one in Limerick and one in Waterford. Shaw negotiated and rediscounted bills for the bankers, accepted their drawings on him, and regularly dispatched large consignments of guineas to the country. The volume of this business was large, amounting in the case of the individual bankers to annual totals varying between £80,000 and £200,000. At times the country bankers allowed balances to accumulate in Shaw's hands, but he also advanced them large sums. In April, 1792, for instance, Shaw agreed to extend the credit of Maunsell & Company, the Limerick bankers, to £20,000 " on particular occasions ". His dealings with his correspondent in London were rather limited, arising mainly from transactions on behalf of his country customers. Shaw was a merchant in a single branch of the inland grain trade, and advanced money to country merchants on receipt of their flour in Dublin. This was at the origin of his bill trade, and as early as 1785 he had developed a fairly considerable business which was totally unrelated to his commodity trade. By the 'nineties Shaw's commodity trade had become a mere sideline to the growing volume of his discounting and accepting activities.[3] In 1797, his son wound up business on his own account and became a member in the partnership of Thomas Lighton & Company, which opened a bank in Dublin in the following year. The Shaws' business was exceptional only in its extent, for the nature and evolution of their operations was reflected in other Dublin and provincial mercantile houses at this time.

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[1] Library of the Society of Friends, London. Gurney Papers, Section II, no. 330E. Richard Pope to Richard Gurney, Cork, 6 Sept., 1770.

[2] Ledger of Courtenay and Ridgway, 1 June, 1791–31 May, 1792, in the possession of Mrs. Olive Ridgway, Rossmore, Mallow, Co. Cork. The London houses were Smith, Wright, Hammet & Co., and Peter Thellusson, Sons & Company.

[3] National Library, Dublin. Shaw MSS, 1785–97.

The pattern of Irish payments was to change radically in the nineteenth century. One of the most important features was, of course, the abolition of the separate Irish currency in 1826, which in the absence of an Irish mint had, in any case, been purely conceptual and not a physical reality. The existence of a course of exchange on London had imposed a great strain on the Irish banks, which even the Bank of Ireland, despite its relatively large resources, felt severely.[1] The abolition of the Irish currency and hence of the exchange strengthened the Irish banking system and, in conjunction with other factors, altered the character of its business. Dublin, Cork and Belfast had all been centres of exchange with London in the eighteenth century, of which Dublin was overwhelmingly the most important, being linked by an organised bill trade with the provincial towns. The early nineteenth century, however, witnessed the decay of this structure in its internal, as well as its external, branches. One of its first manifestations dates from 1797, when the suspension of gold payments in Ireland made the Belfast linen shippers, who had still to find gold to purchase their linens in the North of Ireland, where payment in gold remained the rule, decline to accept bills on Dublin from their English customers.[2] Direct financial relations from the various parts of Ireland continued to develop in the following years, and in 1822 the Court of Directors of the Bank of Ireland noticed that the inland bill trade was in decline, and direct payment to England more common than formerly.[3] This indicated an increased reliance on London, which was now beginning to replace Dublin in the control of the Irish financial system—a change which corresponded to the increased dependence on England in political and economic matters generally.

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[1] See a long resolution made by the Court of Directors of the Bank in the light of a report from the Treasury Committee, the text of which is given in Hall, *op. cit.*, pp. 107–8.

[2] Public Record Office of Northern Ireland. William McCance to Jackson & Rushforth in Manchester, Belfast, 24 April 1797. (Copies of invoices of linen shipped by McCance, and of covering letters.)

[3] Text of the Court of Directors' resolution, Hall, *op. cit.*, pp. 107–8. " . . . that a considerable alteration appears to have taken place in the mode of transacting trade between England and Ireland, whereby payments are made more directly in the way of exchange and much fewer inland bills are made in Ireland, consequently so long as the Bank shall decline to discount bills on London, its discounts must bear a very small proportion to the trade of the country ".

The English Capital Market Before 1914—A Reply

By A. R. Hall

Professor Cairncross has suggested[1] that my original Note in the February 1957 issue of *Economica* involved three propositions about the nature of the pre–1914 English capital market. In fact, however, I was only concerned with two of them, namely, the importance of the new issue market in *total* home investment and the efficiency of that market for providing capital to *industry*. It was a mistake on my part—the suggestion that the proportion of total home investment financed through the new issue market in the years just before 1914 was about 10 per cent., when in fact Ayres, and following him, Professor Cairncross were here referring to industrial investment only[2]—that has apparently led him to believe that I was concerned with his second proposition.

With a great deal of what Professor Cairncross has to say about this proposition—the importance of the new issue market for new *industrial* investment—I am in rough agreement. I was not seeking substantially to " controvert " this " accepted view ". I do feel, however, that this view—that the new issue market was relatively unimportant for new home investment—has been overstated. It is only a feeling because the detailed research necessary to confirm or to deny it has yet to be carried out. Failing this research at the moment it is only possible to mention some of the queries which make me feel sceptical of some aspects of the " accepted view ". It is not enough, for instance, to point out that " the market before 1914 was mainly occupied in converting private into public companies " and that this involved relatively little new money. Is it not the case that this was an essential stage in the process whereby the new issue market could, in the future, provide new funds on a substantial scale[3] and are we absolutely certain that the new money raised by these companies was so negligible ? Is there no connection between the conversions of the 1890's and the fact that in the period 1911–13 the bulk of new issues was raised by existing companies?[1] Further, it is true that " no large amount of capital was involved " in issues by " completely new companies " but at what period in the history of the English stock exchanges have really substantial amounts ever been raised by companies of this type?

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[1] " The English Capital Market before 1914 ", *Economica*, N.S. Vol. XXV, No. 98, May 1958, p. 142.

[2] Professor Paish, who was also cited as supporting this view, in fact considers that the proportion of total home investment financed through the new issue market cannot have been more than 20 per cent., i.e. " not more than £30 m. or so out of a total of £150 m. or more ". F. W. Paish, " The London New Issue Market ", *Economica*, N.S. Vol. XVIII, No. 69, February 1951, p. 2.

[3] One of the *raisons d'etre* of the " no new money issue " (to follow Dr. R. F. Henderson's terminology) is that by obtaining stock exchange status it makes easier subsequent capital raisings. Surely it is this which is relevant to the process of capital raising rather than the original absence of intentions of vendors to approach the new issue market (cf. Cairncross, *loc. cit.*, p. 143).

Finally, even if we grant, for the sake of argument, that only about 10 per cent. of new industrial investment was financed through the pre-1914 new issue market, is this proportion so exceptionally low? Data available in the National Institute's recent publication *Company Income and Finance 1949–53*, while not permitting exact comparison with the pre-1914 estimates, suggest that capital raising by industry through the new issue market in the period 1949–53 was only of the order of 15 per cent. of net company investment in tangible fixed assets and stocks. Consider the following arithmetic derived from the sources and uses of funds statement of Table B of the National Institute's publication which analyses the accounts of some 2,000 quoted manufacturing companies.

	For the years 1949–53 inclusive £m
1. Gross expenditure on tangible fixed assets	1,830
2. *Less* provisions for depreciation	865
Net tangible fixed assets	965
3. *Plus* increase in value of stocks	950
Total " investment "	1,915
4. Total loan and share capital issued	600
Ratio of (4) to (3) *c* 30 per cent.	

But net output of the quoted companies only accounted for *c* 50 per cent. of total net output.[2]

Hence the new issue market raisings of quoted companies accounted for *c* 15 per cent. of net investment in tangible fixed assets and stocks.

Necessary qualifications to this arithmetic, when considering it in comparison to the pre-1914 estimates, are that the investment figures include oversea assets while the capital issued figures include amounts raised other than through the new issue market, e.g. direct placements of debentures and mortgages. Some part of these issues could also have been spent on acquiring assets other than those which have been selected. If this calculation does indicate reasonably accurately the relative use of the new issue market for home industrial investment in the early 1950's then should we be too critical of the performance of the pre-1914 new issue market?

Turning to the major proposition with which I was in fact concerned, namely, that total new issues for investment at home were, during certain periods at least, far greater in volume than the conventional view allows, and that during these periods the proportion of home investment financed through the new issue market was greater than is indicated by the experience of the years 1911–13, the simple answer to Professor Cairncross's strongest criticism is that the new issue figures which he wishes to substitute for those employed by Ayres and myself are grossly inaccurate guides to what they purport to cover, namely amounts of new capital actually called up. That this is so is illustrated by the following table.

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[1] F. Lavington, *The English Capital Market*, p. 208; A. K. Cairncross, *Home and Foreign Investment 1870–1913*, pp. 95–6.

[2] National Institute of Economic and Social Research, *Company Income and Finance, 1949–53*, p. 8.

	New Capital Created	Apparent Calls	Actual Calls
1896	£000	£000	£000
For investment at Home (issues of £200,000 or more)	26,799	14,502	26,522
For Investment Abroad (issues of £200,000 or more)	15,958	11,033	15,745
Total (issues of £200,000 or more)	42,757	25,535	42,267
Total issues	139,300	75,252	?
1897			
For Investment at Home (issues of £500,000 or more)	27,915	11,448	19,362
For Investment Abroad (issues of £500,000 or more)	22,224	11,756	21,744
Total (issues of £500,000 or more)	50,139	23,204	41,106
Total Issues	151,500	77,720	?

Note.—Only those issues of £200,000 or more (1896) and £500,000 or more (1897) for which data were available about actual calls are included in this table.

This table was prepared from the detailed tabulations of new issue statistics in the *Investor's Monthly Manual* and from the December lists of quoted securities included in that journal. The discrepancies between the amounts apparently called and those actually called arise from three main sources: (1) typographical errors, e.g. the dropping off of a nought from a call on a London County Council issue of £2,500,000 which meant that calls of almost £500,000 were not recorded; (2) the use (apparently) of conventional percentages in determining the initial call—data on subsequent calls frequently indicated that these conventions were wide of the mark; (3) the simple failure on the part of the compilers to make a systematic coverage of calls.[1]

No attempt has been made to estimate the total amount of calls that were actually made on all issues. The experience of the large borrowers included in this survey—for the most part they were borrowers of first-class standing—is certainly no guide to the behaviour of the rest. The aim of this survey was merely to confirm a suspicion that the discrepancy between issues and calls which is the basis of Professor Cairncross's criticism of my major proposition arose out of errors in the statistics, not out of the failure of borrowers to raise—more or less—what they sought. Quite clearly the amounts called were in fact much closer to the amounts issued than Hobson's figures indicate. Hence Professor Cairncross's argument, derived from those figures, does not stand.

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[1] The greater part of the discrepancy between the amounts apparently and actually called on large home issues in 1897 was not due to an error but to the bunching of a number of such issues near the end of the year. Sufficient time had not elapsed for the appropriate calls to be made.

His other main criticism of my central argument—that " the issue of capital on the stock exchange was largely for the purpose of disposing of flourishing concerns, hitherto in private hands, to new owners "—cannot be settled, as I have already indicated, without further research. In fairness, however, I should point out that I was well aware of this feature of the new issues of the period and attempted to allow for it in making my judgments about the scale of new money raisings in this period.[1] In doing so I was considerably influenced by the fact that a large number of the " disposals ", probably the majority, did not involve the sale of ordinary shares but only preference shares and debentures. Vendors were not merely " selling out ".

Before considering the efficiency of the home industrial issuing apparatus it is probably necessary to look more closely at the nature of the *Economist*'s new issue series. This has to be determined, as far as I know, from internal evidence and occasional references in the *Economist* and the *Investor's Monthly Manual*. Clearly it does not include all overseas new issues.[2] In addition it does not include all home new issues—in particular its coverage of railway issues is incomplete.[3] From comments on the cycle boom[4] it would appear that, for home issues, it is basically compiled from prospectuses received at Somerset House. If that is the case it is doubtful how relevant its figures are for the functioning of the new issue market as now understood. A great deal of its " new issues " would not be regarded as such now.[5] In fact, this raises the question, suggested to me by Professor Paish, what, conceptually, was " a new issue " in the pre-1914 market when dealings could and did frequently take place in securities which had not gone through what were then often regarded as the mere formalities of listing and official quotation?

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[1] See e.g. A. R. Hall, " A Note on the English Capital Market before 1914 ", *Economica*, N.S. Vol. XXIV, No. 93, February 1957, p. 64, n. 3.

[2] See e.g. *The Economist*, 1896, Commercial History and Review of 1895, p. 5. " In addition to the mining companies included in the above list (i.e. the new capital issues series) a large number placed their shares here, and obtained a special settling day on the Stock Exchange without issuing any prospectus, and large amounts were also placed in companies registered under the Transvaal laws. . . ."

[3] The inadequate coverage of home railway is a constant theme in the comments of the *Economist* and the *Investor's Monthly Manual* on the volume and direction of new issues cf. e.g.: *The Economist*, 1896, p. 859, " In most cases the issues of capital by the home railways are only of a semi-public character, since they are offered in the first instance to existing proprietors *pro rata* to their holdings " ; and *The Investor's Monthly Manual*, 1899, p. 672, " The total of £8,756,000 set down for Home railways probably represents only a portion of the total amount raised by them during the year, as stocks are frequently issued without any public notice."

[4] See *The Investor's Monthly Manual*, 1897, pp. 113 and 386.

[5] Naturally, if this deduction is correct, my whole argument which is based on the *Economist*'s figures is affected. On balance, however, when many of the small issues are excluded and when both the missing home and oversea issues are included (if it is in fact possible to make these adjustments), I feel that the broad outline of my argument about the size and direction of home and oversea issues would still stand.

This possible difference in coverage of new capital raisings by the *Economist*'s series and current ones such as that of the Midland Bank may partly account for my criticism of the traditional view of the efficiency of pre-1914 new issuing mechanism. The kind of issues which I had in mind and which appeared to be included in the *Economist*'s series may well have been primarily provincial issues, which Lavington admits[1] were normally handled reasonably efficiently. I doubt, however, whether complete reconciliation is possible along these lines. I never, of course, intended to suggest " that better and cheaper facilities could not have been desired for the small British industrialist ". I did argue, and would still argue that, even in London, the hotbed of fraudulent company promoters, it was possible for smallish *bona fide* firms to make new issues on reasonable terms and that the number of firms who did make such issues was much greater than would appear to be the case from Lavington's analysis of the sale of industrial securities on the new issue market. Whether or not this judgment is correct can, however, only be decided by detailed research into the processes of industrial finance before 1914.

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[1] F. Lavington, *op. cit.*, pp. 208–9.

When Are Goods More Goods?

By H. A. John Green

Professor Johnson, in a recent note,[1] derives the "substitution theorem" of demand theory as follows. If a collection of goods *B* is chosen when *A* could have been bought for the same money, *B* represents more goods (or at least not fewer goods, since weak ordering is assumed) than *A*. Therefore *A* cannot represent more goods than *B*. If, when *A* is bought, *B* could have been bought for less money, *A* would represent more goods than *B*. It follows that when *A* is bought, *B* must be at least as expensive as *A*.

It is here implied that if *A* is chosen rather than *B*, *A* represents more (or not fewer) goods than *B* (even if *A* contains less of some individual goods). This sounds rather like the converse of the axiom of non-saturation, which states that if *A* contains more goods than *B* in the vector sense (i.e. more of some goods and less of none) then *A* will be chosen rather than *B*. It is not that converse, but an alternative definition of "more goods". Professor Johnson *defines* "more goods" in terms of choice, and when he assumes that "more than" in this sense is an asymmetric relation, he is in effect stating in a roundabout way the axiom that choice is consistent.

Mr. Lancaster has pointed out[2] that if we assume strong ordering the "substitution theorem" can be derived from the axiom of consistency alone, while if we assume weak ordering the axiom of non-saturation is also necessary. Professor Johnson in fact uses both axioms, but makes it appear that both follow from his definition of "goods". They are, on the contrary, quite independent; the illusion of a close relationship between them arises from the ambiguity introduced by the two definitions—the vector definition and the choice definition—of "more goods".

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[1] H. G. Johnson, "Demand Theory Further Revised *or* Goods Are Goods," *Economica*, May 1958, p. 149. I am indebted to Professor Johnson for his comments on an earlier draft of this note.

[2] Kelvin Lancaster, "Revising Demand Theory," *Economica*, November 1957, p. 356, n. 1.

Robbins on Torrens[1]

By Frank Whitson Fetter

The name of Robert Torrens is known to almost every economist, but generally only as a minor figure on the Ricardian stage, or perhaps by Americans as the first Colonel of Marines before Paul Douglas, now senior Senator from Illinois, to make his mark in economics. From Viner's writings students of international trade know of Torrens' contributions in that field, and readers of the Sraffa edition of Ricardo's *Works* get an impression of Torrens as a man of some importance. Professor Robbins' book comes, however, as the first full-length picture of Torrens as an economist. It is a superb job, with a rare combination of careful theoretical analysis, placing of the theory in the larger setting of economic, political and social controversy, and graceful literary presentation. The survey of Torrens' rôle in economics gives a feel of the sweep of English economic controversy in the first half of the 19th century in a way that few books have done. Before Ricardo's first writing as an economist, and when John Stuart Mill was only two years old, Torrens had written *The Economists Refuted*, with its suggestion of much of the theory of comparative advantage. Fifty years later, when John Neville Keynes, who died only in 1949, was six years old, Torrens' pen was still active in defence of the Bank Act of 1844. Or to place his activity by military events—which undoubtedly would have pleased Torrens—here was a man who was an officer of Marines 19 years before Waterloo, and who lived to read the news of Gettysburg.

Torrens did much work of a high theoretical quality, but he was at his best in advocating or attacking specific policies. No matter what one may think of his theory, we have in Torrens the most formidable controversialist in 19th century English economics. The five major topics of his interest were : Production and the Gain from Trade ; Distribution and Value ; Money and Banking ; Colonization ; and Commercial Policy. In each of these fields Torrens said something worth saying, although he often repeated himself, sometimes changed his views, and had a flair for dramatic expression that few economists have approached. On international trade Torrens stated much that Ricardo later developed in greater detail, and apparently he was the first to use the phrase " territorial division of labour ". In his treatment of rent he freed the analysis from the criticism, made of Ricardo's presentation, that the receipt of rent required the existence of diminishing yields or of inferior land. On the theory of wages he, more than any other classical economist, escaped the grip of Malthusian pessimism, with the result that the possibility of raising wages, instead of receiving simply formal recognition, as in Ricardo and Malthus, was an integral part of his thought. He wrote in 1829, and repeated the passage in three later publications : " The labouring classes compose the great bulk of every community : and a country is happy or miserable, as they are well or ill supplied with the necessaries, comforts, and enjoyments of life. The study of Political Economy, if it did not teach the way in which labour may obtain an adequate reward, might serve to gratify a merely speculative curiosity, but could scarcely conduce to any purposes of practical utility " (p. 249).

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[1] Lionel Robbins, *Robert Torrens and the Evolution of Classical Economics.* Macmillan & Co. Ltd. 1958. xiii, 367 pp. 36s.

The two fields in which Torrens' thought had the greatest impact on contemporary policy were money and banking, to which Robbins devotes over a fourth of the book ; and colonization. He was the first to support in print the separation of the Bank of England into an Issue and a Banking department ; he was a vigorous proponent of this plan before the Act of 1844, and after its passage was one of its most persuasive defenders. Robbins' treatment of the debate between the Currency school and the Banking school (pp. 97-143) is the most perceptive discussion I have read of that historic controversy. It is good technical analysis, but Robbins also makes clear that much more was involved than the question whether bank deposits were money, and he puts the whole controversy in the larger setting of the maintenance of international equilibrium. It is a discussion that every present-day economist who follows the international scene could read to advantage.

The theory of colonization, as argued out by English economists in the second quarter of the century, seems farther removed from the issues of to-day than any other topic that Torrens treated. But to the England of that period it was a major issue, and in this area Torrens had an important influence in winning support for the Wakefield theory of self-financing colonization. In connection with this controversy Torrens had some suggestive ideas on economic stagnation, and on the problems of economic development by planning that ran contrary to the operation of the market (pp. 171-181).

It was in commercial policy that Torrens did his most original thinking, in the defence of reciprocity as a means of avoiding deflation and improving the terms of trade, but on this he was so out of accord with the trend of the times that he had almost no contemporary influence on thought or policy. Robbins gives an understanding exposition of Torrens' analysis, but makes clear that he is not " a supporter in the twentieth century . . . of Torrens' particular variety of commercial policy " (p. ix).

My only substantial criticism of Robbins' treatment is in the discussion of money and banking. First, I believe that he is mistaken in his presentation of the Palmer rule on Bank of England reserves. Robbins says the rule was " that, after a certain point, the securities held against note issue should be constant so that the internal circulation should remain constant too, unless acted upon by external gold movements " (p. 116), whereas the rule as explained by J. Horsley Palmer before the Bank Charter Committee of 1832 had referred to the reserve against both notes and deposits.

Secondly, I question both the facts and the interpretation in the discussion of Torrens' speech of April 24, 1833 (pp. 86-90), on Matthias Attwood's resolution on the monetary system, that Robbins attributes to Thomas Attwood. I do not believe that most readers would realize from Robbins' account that Torrens, despite his critical comments, supported Attwood's resolution. More important, however, Robbins' discussion of Torrens' change of view on monetary policy is given a confusing twist as a result of what is almost certainly an error in *Hansard*. Robbins bases his discussion on the report in *Hansard* that Torrens said that before 1819 coin could be freely melted and exported, and that the Act of 1819 forbade melting and export. The legislative change of 1819 was just the opposite, for it removed a previously existing prohibition on the melting and the export of coin. If we assume that Torrens had the facts straight on the Act of 1819—and according to the report of the debate in the *Morning Chronicle* he did—then his change of view between 1819 and 1833 is not as drastic as Robbins suggests, and the " fraud " against which he was protesting in 1833 was still deflation, and not inflation.

Robbins refers a number of times to the fact that Torrens of the Currency-Banking School controversy had a very different view from the young officer of Marines who had defended the " real bills " doctrine and opposed resumption in the Restriction period. The facts are beyond dispute, and no literature of the Banking School in the 1840's had more severe criticism of Torrens' ideas of those years than did his own earlier writing. I would suggest, however, two considerations in this connection : one that makes the shift in Torrens' monetary views less discontinuous than Robbins indicates ; the other that may help to explain this change of view, as well as other attitudes. In his transition speech of 1833, and even in his full-fledged gold standard years, Torrens regarded deflation as more serious than inflation, and much of his support of the currency principle was to prevent an inflation by the Bank that he felt would bring in its wake disastrous deflation. The same concern with deflation is evident in Torrens' case for reciprocity, for there the major emphasis was not on shifting the terms of trade to get more imports for a given quantity of exports—as the argument is likely to run to-day—but to avoid the deflation that Torrens feared would follow an outflow of specie. As late as 1843 he wrote : " . . . immediate and total repeal of the duties upon foreign agricultural produce, unaccompanied by a mitigation of foreign tariffs, would so alter the distribution of the precious metals to the disadvantage of this country, and so enhance the value of our currency as to occasion a further decline in money prices, and in money wages, and to increase, to a serious extent, the real amount of the debt, and the actual pressure of the taxes " (p. 206).

The second possible explanation of Torrens' attitude on this and other issues was his military background. Torrens had a sense of the importance of objectives in relation to their costs, and the chance of achieving them. He loved a controversy, but he led no suicidal charges, and even if in the 1830's he questioned the wisdom of the gold standard it would have been in character for him to leave that alone while he stormed citadels that he thought of greater significance or more vulnerable to attack. Torrens at times also had a spirit of flamboyant nationalism not usually associated with classical economics. Yet one could hardly expect a man, who as the wounded commander of the garrison on the island of Anholt led his troops to victory over a greatly superior force of Danish invaders, always to have looked at life with the same attitude as the successful dealer in government bonds or the star pupil of James Mill's theory of education. It is hard to imagine Ricardo or John Stuart Mill, whatever they might have thought of the economics of reciprocity, writing as Torrens did : " The power and the glory of England find no place in the entries of the ledger. The cosmopolites of the Manchester school would not blush to see the western stars triumphantly floating over St. George's Channel. They would give Jamaica for a hogshead of sugar. They would sell Canada for a bale of cotton. For an additional million of exports they would yield up the trident without a struggle ; and transfer from the hand of Victoria the sceptre of the Anglo-Saxon empire " (p. 231).

A Bibliographical Appendix of over 85 pages lists the 83 books, pamphlets and articles, including two novels, written by Torrens, with a summary of each. In view of the rarity of most Torrens items, and the fact that some of the great economic libraries of the world have only a small part of his works, this is a most useful addition to the book.

Robbins does not present Torrens as one of the outstanding figures of economics, nor does he claim that he had a great impact on British thought. But the treatment is a sympathetic one, and the picture that of a stimulating analyst, a vigorous controversialist, an impulsive, generous, but contentious and probably at times annoying personality, who never lost sight of the fact that economics dealt with people, and that the improvement of their condition was the reason for its study.

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Book Reviews

The Sources of Invention. By J. Jewkes, D. Sawers and R. Stillerman. Macmillan & Co. Ltd. 1958. xii + 428 pp. 31s. 6d.

The emergence of scientific research as a major activity is of so recent an origin that it has received comparatively little attention, and practically nothing has been said about it publicly except by those who have some particular axe to grind. When the reviewer started his scientific career in the 1920's, industrial research was on a comparatively small scale and was scarcely respectable, while research in a University was a gentlemanly part-time occupation which the staff indulged in or not for their own satisfaction. Since then, the expenditure on research has increased enormously, in universities, in government establishments, in co-operative research associations, and in private research establishments in industry. It would generally be agreed that much, though by no means all, of the increased standard of living which has been achieved in the past and which will be augmented in the future, owes its origin to the scientific and technological innovations of the nineteenth and twentieth centuries, and that it is desirable for the flow of invention to be increased. But when we pause to consider the means by which innovation is to be stimulated to the desired degree, we are deluged with contradictory advice from all quarters. We are advised that we must do more fundamental research since this is the only source of epoch-making ideas, that we should do less fundamental research and more development since we already know far more than we can apply, that we should organise research so as to encourage only those advances which are known to be technically possible or thought to be socially desirable, or that we should leave the scientists strictly alone since genius cannot be regimented. It may be true that more and more expenditure on scientific research is desirable, but so is expenditure on the ballet, on holidays abroad and on a host of other activities with a high social value. But except to those who actually carry out the research, scientific enquiry is not an end in itself, and, since a significant proportion of the men of ability are now engaged in scientific pursuits of one kind or another, it is right and proper that these important matters of policy should be discussed.

The present book deals with one aspect of technical progress, namely the way in which inventions are made, and whether the current methods of carrying out research are conducive or deleterious to an increasing flow of inventions. The authors begin by stating what they term " the modern view of invention ", namely that in the nineteenth century most inventions came from the individual inventor who had little or no scientific training, while in the twentieth century men with the power of originating are largely absorbed into research institutions, and useful invention is to an ever increasing degree issuing from the research laboratories of large firms. This view, which is extremely widely held, is often backed up by the further dogma that once a particular need has been identified it is only a question of spending sufficient time and money for the problem to be automatically solved. There are, however, opposing views, which range so widely that they can scarcely be catalogued. The authors had therefore to decide which view to support before they could pronounce upon major matters of policy, but instead of adopting the dogmatic approach, which is customary in this field, they decided to assemble and examine the evidence available. This they have done in two extremely important chapters, the first dealing with " Inventors and Inventions in the Nineteenth Century ", and the second with " Some Recent Important Inventions ", backed up in Part II of the book by 140 pages of the summaries of 50 case histories. These chapters are full of interest, and everyone who has thought about the subject will be delighted from time to time to see the heresies of his opponents confuted by the facts and seriously alarmed at other times when his own beliefs are in turn confounded. Those who have not thought at all will finish these chapters with their interest aroused and their minds confused, and they will turn for guidance to the chapters dealing with " The Individual Inventor ", " Corporation Research " and " Conclusions and Speculations ". Here, however, the authors are on much weaker ground, and they could and no doubt will be accused of deserting the objective for the subjective approach. But, unless they were prepared to say nothing at all, they could hardly do otherwise, for research is such an individualistic matter that every generalisation is bound to be based upon half-truths and unjustified parallels. Not all the conclusions drawn by the authors are therefore likely to be acceptable to many of their readers, but, whether one agrees with the opinions expressed or not, everyone who has to deal with the problems discussed will benefit greatly by studying what the authors have to say and by returning time after time to the factual data assembled.

The fundamental dilemma in trying to encourage invention is that scientific research is not in itself purely scientific but involves at some stage or other a large element of intuition and imagination. How then can we organise what has not yet been discovered (and may in fact be undiscoverable), and if standard forms of organisation are inapplicable have we any alternative to a free individual choice amounting practically to chaos, in which advances are made purely randomly ? Now in practice the majority of scientists do not ask themselves these questions, but instead they set about doing and organising their research in one way or another. Each will do it in his own way, some more efficiently than others, but some kind of organisation there always will be. Research cannot be carried out without money or without time, and whoever provides these, even if it be the individual inventor himself, cannot escape the responsibility of deciding how much of each shall be applied to any particular project. It is often said that university research is free from direction whereas " corporation research " is almost entirely fettered. But since we are committed for good or ill both to large university and to large industrial research departments, is this really so ? The subjects of research in a university department depend in the first place largely on the head of the department. But he depends for funds partly upon the university authorities (who in turn depend upon the Treasury acting through the U.G.C) and partly upon such bodies as the D.S.I.R. who can control the number of research students in a university department and the grants for special equipment. The decisions involved depend upon the judgments of a number of individuals as to the worthwhileness of the research, and the judgments may or may not be well informed (most of them are certainly taken at a distance remote from the scene of action). The same process takes place in industry, and in both cases a complex series of individual judgments is involved—as to whether the field is likely to be a fruitful one, and whether the research worker concerned has the qualities required. There is no royal road to success in organising research either on a large scale or on a small, and such criteria as those based upon the desirability of spending an arbitrary fraction of corporate or national income on research are no substitute for the hard work involved in judging the merits of any particular project. It is, of course, essential that no one should attempt to carry out functions that he cannot possibly perform, and those who are responsible for obtaining the money required to implement a research programme are seldom in a position either to initiate the programme, or far less to carry it out themselves. This poses difficult problems of communication, but, unless they are solved, a research department can scarcely be fruitful. Everyone who has to deal with these problems will benefit by reading this book.

A. H. WILSON.

The Measurement of Utility. By TAPAS MAJUMDAR. Macmillan & Co. Ltd. 1958. xiv + 149 pp. 13s. 6d.

This excellent little book gives a fair summary of the principal utility theories that still compete for favour amongst economists, preceded by a useful account of the meaning of degrees of measurability that might be assigned to utility in a welfare sense. As a matter of definition an ordinal theory is one that assumes a strong or weak ordering of utilities but no ordering of utility differences, while cardinal theories involve at least an ordering of utility differences. Nevertheless, Mr. Majumdar implies that most ordinalists (e.g. Hicks and the author himself) would, if pressed, subscribe to the view that utility differences are orderable. This seems to me most unfair on ordinalists who are, thus, made cardinalists, if not the " flat-footed " cardinalists referred to by Professor Robbins in his Foreword. I get the impression that Mr. Majumdar may have been influenced in this view by a slip on p. 38 where he gives three very different-looking sets of indices as equivalent measurings of utilities whose differences are ordered. But in fact each of these sets has a different order of differences, of which there are 10, not merely the 4 he tabulates. The measures are, therefore, not equivalent. For a continuous utility function, with utility differences ordered, all the indices are determined once a number has been assigned to each of a pair of utilities. Whether the utility function is determinate, at least to this extent, or indeterminate (but ordinal), is what makes the gulf between cardinalist and ordinalist. There is, surely, no such gulf between the " daintiest " and most " flat-footed " cardinalist.

The second part of the book is a critical examination of the five main utility theories : (1) introspective cardinalist—Marshall ; (2) introspective ordinalist—Hicks ; (3) behaviourist ordinalist—Samuelson ; (4) behaviourist cardinalist—Morgenstern-Neumann ; (5) introspective cardinal-revivalist—Armstrong. The exposition of these five contrasting theories is, on the whole, sound, and the critique fair, with, perhaps, one exception, the treatment of (1), Marshall, Robertson. . . At least for the purpose of formulating a theory of demand, Marshall, and Robertson certainly, assume merely a determinate utility function, and it is surely clear that the assumption of constant marginal utility of money was Marshall's way of insisting on its variability (diminishing marginal utility of income). It was left to Hicks to elaborate with much elegance a more complete demand theory (using only an indeterminate utility function) ; but all this could have been done by Marshall had he followed up systematically the income-effect to which he drew attention, by pointing out that many demand-theorems hold only in so far as we assume the constant marginal utility of money. Mr. Majumdar seems to take the view that the removal of this assumption would make measurability impossible (not merely difficult), presumably because an individual, although able to compare the marginal utilities of constituents of a given income, is unable to compare the marginal utilities of different incomes.

While mainly in agreement with Hicks as " introspective ordinalist ", Mr. Majumdar has some relevant criticisms of Hicks' modified position in his *Revised Theory of Demand* ; but I am unable to see how he escapes the difficulty of non-transitive indifference by substituting transitive compensation. The point about non-transitive indifference is not that there is no such thing as pure indifference, but that pure transitive indifference is indistinguishable from non-transitive indifference by any introspective (or behaviouristic) test. Similarly, there is no way of discovering how much *X* *exactly* compensates for a given loss of *Y*.

The behaviourists (3) and (4) are next dealt with adequately, though it is not quite clear to me that the Neumann-Morgenstern theory *is* behaviourist. No doubt, indifference might be described as a 50/50 choice in a run of choices exactly repeated, but what kind of " stimulus " is a " probability of *A* happening " ? Light-waves, sound-waves, touchings, agitations within the body . . . seem to be the ultimate constituents of the " stimuli " of the behaviourist. How do these combine to make a " probability " ?

My own " flat-footed " cardinalism comes last, (5), on Mr. Majumdar's list and his remarks are, on the whole, sound. But I find no refutation of the cardinalism I have advocated. Mr. Majumdar has, however, brought out neatly one important point, namely, that the concept of group-preference, implicit in my concept of group-welfare, is not transitive. I quite agree, but the purpose of my argument was to discover the consequence of adopting the ordinalist's axiom that a community is better off with *A* than *B* if some members prefer *A* to *B* and no members prefer *B* to *A*. I think this axiom is trivially false, but if my opponents adopt an axiom which implies what I assert on other grounds, it would be churlish to look such a gift-horse in the mouth.

Naturally I disagree with Mr. Majumdar's main thesis, but a review is hardly the place for the marshalling of opposing arguments. Whether he is right or wrong, there is no doubt that his book is an excellent guide to the logical and philosophical questions that are at the root of the utility controversy.

W. E. ARMSTRONG.

Essays in the Theory of Economic Growth. By EVSEY D. DOMAR. Oxford University Press, New York. 1957. ix + 272 pp. 36s.

Problems of growth are undoubtedly fashionable, Mr. Domar is one of the leaders of the fashion and this collection of (mainly) reprinted essays is surely " haute couture ". One can only hope most sincerely that the silly and vexatious custom of condemning the work of others which one either does not understand or like (or, alas, both), as merely fashionable, which is beginning to plague economics almost as much as it does contemporary philosophy, will not prevent anyone from reading and enjoying this book.

For Mr. Domar combines a nice sense of the limitations of both theory and common sense with a gift of lucid and witty exposition. His mathematics is stabled in appendices while the arithmetical examples which live in the text are chosen with felicity and illuminate the argument without resorting to special pleading. The problems discussed are all interesting although one or two are perhaps just a trifle too light for this master.

It is inevitable that a collection such as this should suffer a little from repetitiveness. In his most enjoyable Foreword, Mr. Domar warns us of this himself. None the less, the reader will sometimes have to fight a certain sense of dismay in meeting old, and well loved, friends quite so often. For the student this has obvious advantages. Starting with the cosy " A Theoretical Analysis of Economic Growth " addressed to the tribal meeting of American economists and going on to the more closely reasoned " Expansion and Employment ", designed for visual rather than aural absorption by members of the American Economic Association (i.e. reprinted from the *American Economic Review*), he can reach the grand finale (although it came first, chronologically), of " Capital Expansion, Rate of Growth, and Employment " which was directed to the devotees of *Econometrica*. If after that he does not understand the " Harrod-Domar " growth model, there is not much that can be done for him. These papers are too well known to require comment here. They still make excellent reading. One would have been grateful for a new essay at this juncture devoted to the stability of the process described. For who can doubt that Mr. Harrod had been too pessimistic and Mr. Domar perhaps a little unconcerned in their original work ? The price mechanism and its role in changing factor proportions or consumption and investment plans is rather conspicuous by its absence.

The essay " The ' Burden of the Debt ' and the National Income " which here is sandwiched between the three mentioned above is rather pedestrian. No doubt what Mr. Domar had to say there needed to be said at the time when it was first printed—one is not so sure about this in the reprinting. On the other hand " The Effect of Foreign Investment on the Balance of Payments ", although it deals with an exactly analogous problem as the " Debt Burden " paper, was certainly worth reprinting. The reason is that the matter here is considerably more complex, involved and subtle and many of us would be hard put to work it out for ourselves. It is an excellent piece of reasoning.

" The Problem of Capital Accumulation " is extremely useful to all who have puzzled about Mr. Sweezy's exercises in " underconsumption ". Mr. Domar corrects Mr. Sweezy and spreads light where there was doubt.

" Depreciation, Replacement, and Growth " is the sort of journal article which remains memorable for a long time. The fact that depreciation far exceeds replacement, when depreciation is " straight line " and investment is growing, is only obvious when it has been stated. Mr. Domar's incorporation of this feature of investment into his model of growth is first-class. The equations are by no means straightforward and the absence of analytical solutions is distressing but, probably, inevitable. None the less, a link is established between the life of equipment, factor ratios, propensity to save and growth and it is a link of great interest. More work is required here. There is one, perhaps quite important, omission. It is easily shown that with a perfect capital market, the equilibrium rate of replacement and depreciation would coincide if entrepreneurs maximise their profits. This may be of little interest in analysing economies where the accountants' ritual is all-pervasive (e.g. the U.S. and U.K.). But when it comes to planning for the underdeveloped, and Mr. Domar discusses this, the Pareto optimum will require a similar coincidence between the two rates and perhaps planners should see to it that they do coincide. One would like to have Mr. Domar's views on this. " The Case for Accelerated Depreciation " makes use of the results of the paper just discussed in analysing various ways of influencing investment decisions by tax relief on investment. It is both instructive and stimulating.

In " A Soviet Model of Growth " Mr. Domar gives us, one suspects, a much improved version of an article published by the Soviet economist Fel'dman in 1928. The model deals with the problem of equilibrium growth when two sectors are distinguished, one producing producers' goods and the other consumers' goods. A number of simplifying assumptions are made and we are off. It is, by and large, an exhilarating journey and if it had not been for some recent work by Samuelson and Solow, it would have been quite new territory. As it is, Mr. Fel'dman suffers a little from the comparison (although we should recall that 1928 is almost the " stone age " for these matters). One important feature of this model is that it clearly demonstrates that for a closed economy, the capacity of its producer goods' industries is likely to be quite as important a matter governing its rate of growth as is the propensity to save—obvious, but none the less important and in need of careful analysis.

This essay completes a very pleasant and enjoyable book.

F. H. HAHN.

The Theory of General Static Equilibrium. By ERALDO FOSSATI. Edited by G. L. S. SHACKLE. Basil Blackwell. 1957. xvi + 247 pp. 30s.

The book gives us an outline of the theory of general equilibrium. It begins in a way which might make one think that it was meant to be more than that ; the introductory chapters on the nature of economics, on its methods and development suggest a textbook approach. But this is not a textbook. The connection between the introduction and the main topic of the book is quite remote.

The exposition of the theory follows the traditional line of counting equations and unknowns in a very abstract system. No attempt has been made to bring this system closer to reality ; no practical problems or actual events have been even mentioned. This is a theoretical book in the full sense of this word, and it presupposes a certain familiarity on the part of the reader with high levels of abstraction.

It does not presuppose any special knowledge of mathematics. The main argument is verbal. Some parts of it, especially those referring to the consumer's behaviour, are remarkable. But there are also parts in which the cutting out of complexities does not help to make the exposition clear. For instance, in discussing equilibrium of production the author lists as data the available quantities of the factors of production, the prices of the products and of the factors, and the coefficients of production. He determines then the outputs of the products by the condition that in each case the marginal cost must be equal to the price. In this form the system is insoluble ; because if both the prices of factors and the production coefficients are given, the marginal costs are also given, and they cannot be made equal to the given prices of the products by any sort of adjustment of outputs. Even if there were some fixed factors, and the marginal cost curves were upward sloping, the system would still be overdetermined, because in addition to the conditions listed there would be an additional condition in the form of the production possibility function determined by the conditions of technique and the available productive resources.

Similar difficulties seem to arise in the discussion of the problem of capitalisation. All of them, however, affect only certain stages in the argument and are the result of splitting it into parts for expository reasons. The formulation of the general theory is faultless. The chapter on money does not go beyond what is necessary to explain why there cannot be any theory of money in a general equilibrium system, but in this limited scope it serves its purpose very well.

The book has been translated by Mr. B. N. Sinha of the University of Genoa and by Professor Shackle. They must be thanked for having made this interesting work accessible to English-speaking students and congratulated on the elegant form in which they have succeeded in presenting it. Professor Shackle has also written a short foreword in which he has put Fossati's contribution in the right perspective from the point of view of the general trends in the development of modern economic theory.

S. A. OZGA.

The Theory of Inventory Management. By THOMSON M. WHITIN. Second Edition. Princeton University Press. Oxford University Press. 1957. ix + 347 pp. 52s.

The appearance of a second edition of *The Theory of Inventory Management* is indicative both of the success of the first edition, which when it appeared was virtually the only book of its kind in existence, and of the growing importance of operational research expecially in the inventory field. For a great many people their introduction to modern inventory management, theoretical and practical, was by way of Whitin's work, and it is to be expected that this will continue to be the case for some time in the future.

The present volume is, in fact, a reprint of the first edition with a certain number of minor misprints and errors removed, together with six papers on various related topics which Whitin has published in the past four years. The inclusion of these appendices presumably has as its object bringing the reader up to date with more recent developments in the field, showing more clearly than the main text what problems remain to be solved, and in what way rather difficult technical complications tend to arise.

The first part of the book deals with the problem of the control of inventories in the firm. It discusses alternative systems of control and shows how optimal ordering quantities and safety allowances may be computed. In addition, the question of the place of inventories in the theory of the firm as understood by economists is examined, and considerable doubt is thrown on the validity of the contributions made by Eiteman and Boulding, neither of whom offers an adequate account of the behaviour of inventories and of the way inventories fit into conventional marginal analysis.

Inventories in the economic system as a whole are considered in Part II. There is a chapter dealing with their role in aggregated models in terms of their stabilising or destabilising effects, and of the question whether inventories tend to vary directly with sales or with the square root of sales. It is pointed out that the latter assumption may lead to stability where the former does not, and that there is a considerable amount of evidence in support of the view that inventories vary less than proportionately to sales. The second chapter in this section is concerned with inventories in disaggregated models, especially those of Leontief, von Neumann, and the U.S.A.F., and is, perhaps, most interesting for a discussion of the practical difficulties of applying these models.

Part III is devoted to an analysis of inventories in the U.S. military establishment. Although at first glance this would appear to be of interest only to a rather narrowly specialised class of readers, in fact it throws considerable light on the general problem of the control of inventories in a large organisation. One topic which Whitin deals with at some length is that of military value, in particular as it relates to the evaluation of the costs of depletion. He indicates that this question cannot be treated in isolation from strategic considerations, but that so far very little is known about the relationship between strategy and value. It must be noted that this point applies with equal validity to civilian organisations, and that one of the great gaps in operational research at the present day lies in the field of preference, value, and criteria of efficiency.

The technical appendices are concerned with such matters as multi-stage inventory control, and the derivation of a unit ordering formula for commodities in low demand. In addition, there is a summary of Professor Schneider's pre-war paper on inventory control which shows to what extent Schneider had anticipated more recent work in this field, and even dealt with some interesting problems of linear programming.

In conclusion, it may be said that Whitin's book continues to constitute a first-class approach both to the subject of inventory control, and to operational research in general. The only major criticism to be made of it is that the use of appendices does tend to break the argument up excessively, so that it is to be hoped that when the third edition appears it will be rewritten to the extent of incorporating more recent analysis in a general introduction and survey of the field.

M. H. PESTON.

Banks and Politics in America from the Revolution to the Civil War. By BRAY HAMMOND. Princeton University Press. Oxford University Press. 1957. xi + 771 pp. £5.

Mr. Bray Hammond, a retired official of the Federal Reserve Board, has been known to be working on a history of the political aspects of American banking, and it is now apparent why we have had to wait so long for his book. It is a very long one, packed with material drawn from a wide range of sources, both contemporary and secondary. Mr. Hammond pleads that he is an amateur in every possible direction, but this modesty must be discounted. In fact he is a historian who understands banking, and knows what central banking is about. This understanding is not limited to American conditions: in a number of passages (most of all, towards the end of Chapter 14) he shows an unusually deep understanding of English monetary history.

A large part of the book is concerned more or less directly with the first and the second Bank of the United States, which he regards as an almost continuous story: the two banks " served the same needs in the same way for forty of the forty-five years from 1791 to 1836 ". There is also a useful, if highly specialized, history of early Canadian banking politics, and some account of the reaction in the sixties against the Jacksonian phase in the U.S.A. But the main interest of the book I found in Mr. Hammond's interpretation of the Jacksonian attack on the second Bank of the United States. This attack appears as part of New York's attack on Philadelphia and the struggle between these two cities for leadership. This is a very different story from the old one of a revolt of the debtor frontiersman against the monied powers of the east; Mr. Hammond's story is of an " attack . . . on some rich men in the interest of some other rich men".

Throughout the book—in the parts relating to Canada as well as the United States—the author emphasises that the agrarian interests were generally not inflationist. Rather the agrarians were " hard money " men; this was true both before and after Jackson—and most of all, in the Jackson episode itself.

Altogether this is a notable contribution not only to banking history but also to wider American studies. Though few English readers will have time to read all of it, all interested in the history of the American economy should dip into it. And it is written with such a lively wisdom that many will find the book holding them much longer than they intended.

R. S. Sayers.

The Development of the Soviet Budgetary System. By R. W. Davies, with a foreword by Alexander Baykov. Cambridge University Press. 1958. 343 pp. plus Bibliography and Index. 45s.

The book begins with a rather too perfunctory look at the budgetary system of Imperial Russia, but soon plunges into a fascinating and remarkably lucid account of the first efforts of the Soviet government to cope with financial problems. Ignorance, misplaced idealism and the chaotic political and economic situation led to a period of almost unbelievable confusion which characterised Soviet finances in the period of war communism. Taxation degenerated into arbitrary requisitioning by local soviets—thus an instance is cited in which a town imposed a levy of 3,000 roubles on all who did not subscribe to the local *Pravda.* Eventually there was a complete collapse of the currency, accompanied, in 1920, by a unique and (of course) ineffective effort to devise a state budget in kind, without money. Dr. Davies does right to remind us that not only politicians but also the Party's economists assumed at this time that this was the right way for a socialist economy to proceed. While the New Economic Policy, launched in 1921, brought with it an eventual restoration of sanity, from the Communist standpoint it meant a retreat, and it is clearly shown that within a very few years the government was using fiscal weapons first to limit, then to penalise, and finally to drive out of existence the private economic activities thought to be politically and ideologically undesirable. In the last resort, taxes on such categories of citizen were made to exceed 100 per cent. of income. Thus if anyone still suffers from the illusion that collectivisation of the peasantry in Russia was a voluntary process, he should read carefully page 222 of this book.

Dr. Davies goes on to make a detailed study of the financial system which developed in the period of the five-year plans, up to 1941. He shows how profound was the influence of the industrialisation drive and the increasing diversion of resources to armaments on the shape taken by public finance after 1929. There is a most valuable and clear exposition of the structure of the budget and of its many inter-connections with economic enterprises. Developments since 1941 are briefly outlined in a final chapter which also includes some stimulating and important reflections on the adequacy of the Soviet financial system. Under Stalin it achieved maximum concentration of resources on heavy industry and arms by intense centralisation, but, to cope with the needs of a modern industrial economy, considerable changes will certainly be necessary.

Dr. Davies wisely refuses to discuss the rightness or wrongness of Soviet political decisions. He takes them as given. In this way he has almost entirely succeeded in avoiding bias. Only occasionally does one feel that perhaps certain points have been unnecessarily passed over in silence. For example, while the rise of prices in the 'thirties is shown, and an increase in money wages referred to, there is no word to suggest that a fall in real wages occurred. Then, although there are extensive references to the many victims of the purges who were prominently connected with public finance, the fact that they *were* victims is not mentioned, neither are the purges. One might also have expected more understanding for the opposition of financial experts to the vastly exaggerated plans of the 1928-30 period. However, taking the book as a whole, no serious scholar (as distinct from the professional propagandist, of whom there are many in the Soviet field) can have legitimate ground for complaint. The basic approach is wholly sound. Thus it is right to analyse turnover tax as a fiscal device, to consider its impact on various commodities and different strata of the population, to note its vital role in financing heavy expenditures on investment and the armed forces, without introducing into the account the irrelevant note of moral indignation.

We should be grateful to Dr. Davies for so excellent a book, a real contribution to our knowledge of the Soviet economy.

A. NOVE.

The Chemical Industry During the Nineteenth Century; A Study of the Economic Aspects of Applied Chemistry in Europe and North America. By L. F. HABER. The Clarendon Press, Oxford. 1958. xii+292 pp. 45s.

The bewildering array of symbols and equations in most chemists' writings about the chemical industry has long been a sure guarantee against interloping. Until recently economic historians have had to fall back mainly upon biographical material. Within the past few years, however, chemists such as Dr. Hardie, Dr. Dickinson and Mr. Brightman have skilfully interpreted particular parts of the story for the non-specialist. Now Dr. Haber has done this on a much wider scale, dealing on the one hand with the development of the Leblanc factories and the coming of competition from the Solvay and electro-chemical processes, and on the other with the production of a growing range of synthetic dyes. There are also useful chapters on technical education. This is a most valuable work of reference, a guide book for anyone who lacks technical knowledge of the subject.

While the book's great merit is that it draws upon English, German and French technical writings and presents conclusions in language the layman can understand, these very sources have their pitfalls when, as in this case, they are used as a basis for economic history: the writers were usually unconcerned about economic aspects. Dr. Haber, in setting out to look at the industry in economic terms, is not always able to shake himself free of their shortcomings. He has made a valiant attempt to seek compensation in other types of source, such as parliamentary papers, which often do discuss the subject in economic terms, and business histories, which occasionally do; but he has been unable to go behind the printed page and work upon actual business records. These would have drawn his attention to the kinds of economic problems which were confronting manufacturers at various times and the ways in which they were meeting these problems. They would, for instance, have caused him to write differently about manufacturers' associations: price-fixing was certainly practised in the soda trade in the later 1830's and 1840's. They would have helped to pull together what tends at times to be a series of individual studies of particular concerns. In the last chapters, when he deals with such matters as the effects of patent law and of government intervention or with labour questions, he is clearly aware of the need for this integration, to ask *why* events occurred as they did and not merely *what* happened; but these questions should, surely, pervade the book as a whole and not be left until the end.

Dr. Haber's chief handicap seems to be that, in trying to write about the whole of Europe and North America, he has attempted too much. (Only when so globally preoccupied is it possible to list British alkali production under the headings of Lancashire and Tyneside on the ground that " Lancashire includes the Midlands, Wales, Southern England and Ireland. Tyneside includes Scotland " (p. 59). Clearly, early nineteenth century developments in France, and events in Germany from the 1870's need to be discussed; but would not a much more intensive enquiry into happenings at the heart of the story, in Britain, have yielded more rewarding results on the economic side than the present extensive, but rather piecemeal, treatment ? In this connection, it is regrettable that much of the book seems to have been written about 1950; although most of the publications which have appeared since then—some of which do attempt a more intensive treatment of parts of the subject—are listed in the bibliography, they are usually ignored in the text. It is a pity that this has to be said of a significant and valuable book which, despite its weaknesses as economic history, is to be warmly welcomed as an important pioneer venture.

T. C. BARKER.

The Mexican Petroleum Industry, 1938–1950. By J. RICHARD POWELL. University of California Press, Berkeley. Cambridge University Press. 1956. xiv + 269 pp. 30s.

On March 18, 1938, the Mexican government " with shocking suddenness " told between fifteen and twenty of the largest petroleum companies, including all those considered to represent pernicious " foreign economic imperialism ", that all their property and equipment being used to exploit, transport, refine or sell petroleum or its products had been expropriated. The shock did not arise because there had been no preliminary steps leading to the expropriation or no handwriting on the wall; the shock for the oil companies lay in the fact that they little dreamed that Mexico would have the fortitude or the audacity to attempt to operate the industry without the aid of foreigners.

" Nearly forty years of oil activity in Mexico had instilled into the companies a sense of vested interest in the country, an acceptance of their status as the fountains of energy for prime movers and perhaps a feeling that they were the torchbearers of civilisation in a benighted land. At least from the time when the first great deposits of oil were discovered, the companies represented themselves as one of God's gifts to the Mexican people . . . The Mexicans wished to convince the world and themselves that they constituted a sovereign nation . . . "

This is a familiar story to students of the contemporary Middle East. *Mutatis mutandis*, these words might well have been written of Anglo-Iranian's state of mind before 1950, or applied to the glossy brochures of Aramco. But Mr. Powell is not concerned with the psychological atmosphere underlying the Mexican government's decision to nationalise the national oil resources, but rather with the effects of the decision. He is concerned to examine the success or failure of the Mexican experiment in running her own petroleum industry. The task leads him into a lengthy study of all aspects of the industry—administration, production, exploration, distribution, consumption, international sales, labour relations and finance. His conclusions have an interest beyond the limits of purely Mexican affairs.

In his view, closer regulation of the oil industry would have effected all the economic aims of expropriation without the deleterious effects of drawing away capital, diminishing exploration, and incurring the punitive effects of the blockade of Mexican oil on the world markets introduced by the international oil companies. Moreover, he believes expropriation limited the supplies of capital since domestic capital was scarce, thus limiting the growth of national income and making correction of the extremely inequitable pattern of income distribution more difficult. But he realises that expropriation was not inspired by purely economic considerations but by the desire to assert national economic independence. Mexico forwent economic satisfactions in the form of a more rapid growth in the standard of living in return for fewer economic satisfactions and more independence. It is true that hopes of more rapid economic progress were among the motives for the act of expropriation, hopes which proved mistaken. But after twelve years of nationalisation, Mexican opinion felt these disappointments to be outweighed by the non-economic advantages of controlling their own destinies.

D. C. WATT.

Under Chartered Company Rule. By K. G. TREGONNING. University of Malaya Press, Singapore. Oxford University Press. 1958. v + 250 pp. 30s.

In this first account of the whole of the period of Chartered Company rule in North Borneo, Mr. Tregonning successfully presents a great deal of material, and especially new material drawn from the files of the British North Borneo Company in London and of the local government. He begins by tracing how from about the middle of the 19th century a number of foreign adventurers made efforts of varying degrees of seriousness to start developments in what is now North Borneo but then formed part of the vaguely defined dominions of the decaying Sultanate of Brunei. At one time or another American, Austrian, German, Spanish and Dutch interest was excited. In the end British interest prevailed, but British official opinion was much more concerned to keep possibly hostile foreign powers out of a position flanking the main route to China than to take responsibility for administering a territory with very speculative developmental potential. The revival of the device of the chartered company, exercising a sovereignty ceded by the Sultan of Brunei under the umbrella of British protection, admirably served that purpose.

The Company, beginning with no experience of colonial government, made a number of mistakes in early years, to its own cost as much as to that of the territory ; but it established law and order, it abolished slavery, it built roads, it promoted trade in old products and introduced new ones, it started schools and hospitals ; in sum it did very much what was done in more orthodox colonies. Mr. Tregonning takes the history up to the Japanese occupation in 1941, which marked the effective end of the Company's conduct of affairs, since after the ejection of the Japanese the Company ceded its rights and the territory became a normal British colony. He concentrates on the actual conduct and procedure of the administration. The form of presentation, which traces the history of the whole period under a series of headings—Administration, Economic Development, Native Administration, Labour, etc.—produces a fair amount of repetition in the various chapters, and makes it difficult to form a picture of the over-all development in successive stages of the territory's history. It is perhaps also a criticism that in such chapters as that dealing with economic development, Mr. Tregonning makes no use of tables, which to many readers might provide a clearer picture of the growth of trade and revenue or of changes in the racial make-up of the population as Chinese and other immigrants moved in.

Mr. Tregonning leaves some questions unanswered : e.g. how did the Company separate the profit and loss elements from the public finance elements in its management of the revenues and expenditures of the territory ? or what was the extent not of control but of influence from Singapore and the more distant Colonial Office ? (I know by personal experience that there was a regular flow of information from Whitehall to the North Borneo administration.) Mr. Tregonning attempts no general assessment of whether the territory might have developed faster than it actually has done if it had been more completely assimilated to the system of administration centred upon Singapore. He does, however, provide good reason to conclude that Chartered Company rule was a reasonably efficient form of government in the particular circumstances of North Borneo, and that the Company pursued the objectives of colonial policy in accordance with the changing attitudes of the times with a vigour and success not enormously different from those of territories administered in more customary fashion.

SYDNEY CAINE.

The Colombo Plan and Other Essays. By FREDERIC BENHAM. Oxford University Press for the Royal Institute of International Affairs. 1956. viii + 89 pp. 7s. 6d.

This is a short book consisting of five essays, all dealing with aspects of the economic problems of underdeveloped countries, especially in the Far East : a review of the Colombo Plan, deficit financing, protection, over-population, and price stabilisation for primary products. They are all brief—indeed remarkably so when one considers the magnitude and intricacy of some of the subjects treated. But it must be said at the outset that Professor Benham is a master of the art of concentrating on essentials and of lucid exposition.

He has many wise things to say although I fear that not all of these may be popular. Thus he warns in more than one essay against the dangers of attempting too much in the way of industrial development before countries have an adequate structure of public utilities and transport and before they have raised productivity in the agricultural sector, where a surplus is so vital in creating a market to absorb industrial products. He urges the need to concentrate scarce resources on developmental expenditure ; and he warns that " expenditure on the social services, with the exception of technical and vocational training, does not come into this category " (p. 7). He points to the need for birth control in some underdeveloped countries. " Measures of planned investment such as those embodied in the Colombo Plan are, of course, valuable and essential. But the only permanent solution to the problem of poverty in the Far East, as in the West Indies and southern Europe, is a drastic limitation of births " (p. 89).

There is much else in the same vein. It is not perhaps very startling ; but it deserves repetition. The shortness of the essays has the merit of focusing our attention on such fundamentals. Unfortunately it also robs us of Professor Benham's elaboration of many points. For example, he notes the great cost of any programme of agricultural extension work to tackle the immense problem of raising peasant productivity. " In these circumstances, it seems that any significant impact upon apathy and ignorance must involve intensive propaganda to stir up the people to help themselves " (p. 12). This is no doubt desirable. But how is it to be achieved ? Again he argues that the capacity of underdeveloped countries to absorb more capital could be increased by the use of foreign technical experts and administrators. This is true ; but there is no examination of the many problems of recruiting such people and of using them effectively. Surely also the advocate of protection can argue that the essay on this matter ignores a number of arguments by which he sets greatest store.

These essays thus leave us with problems to ponder further. Their merit, however, lies in a brief and clear statement of many essentials of the problems they survey.

A. D. KNOX.

The National Income of Tanganyika, 1952-54. By ALAN T. PEACOCK and DOUGLAS G. M. DOSSER. H.M.S.O. 1958. 78 pp. 7s. 6d. net.

This publication, No. 26 in the Colonial Research Studies Series, presents national income estimates, and related statistics, for Tanganyika for each of the three years 1952–54. The estimates suggest average incomes in the region of £16 5s. per head, which, though low, nevertheless refute (as the authors note in a trenchant comment) the alarmist observations made on the Tanganyika economy by the United Nations Mission in 1954. A pleasing feature of the short publication is, indeed, the asides and comments which are interspersed in the discussion of concepts, procedures, statistical difficulties, and plans for future work. The authors skilfully use their findings, while specifically recognising their limitations, to correct common misapprehensions concerning, for example, the significance of exports or of livestock production in the economy, or the weight of the tax burden. They point out that these by-products of national income estimating provide an important justification for the exercise itself.

The discussion of concepts is thorough. There is a useful critical review of recent exchanges of opinion on the more controversial aspects, e.g. the propriety of including a value for non-marketed goods and services in the national income, and the basis for valuation when included. They decided to include several categories of non-marketed production, valued as far as possible on an opportunity-cost basis. The difficulties involved in this course are explained. But it is somewhat surprising that there is no indication why " subsistence " labour expended on building operations was included while that expended on capital improvements on agricultural holdings was excluded; or why the subsistence production of firewood was evaluated and included while that of water (the supply of which in some parts of Africa is expensive in terms of labour) was left out of account. These omissions in the discussion, however, should not give the impression that the authors have not laid their cards on the table; in this respect their report is generally beyond reproach and highly informative.

The authors include a table for 1954 of inter-industry transactions involving fourteen sectors. (This table is in Chapter II on p. 46, and not in the non-existent Appendix A referred to on p. 14, n. 2.) The table does show, as they point out, that inter-sector interdependence is small, and the quantitatively most important inter-industry transaction statistic is in fact relatively small; it occurs between the staples sector (grain) and the crafts sector in respect of beer-brewing, thus largely in the subsistence economy, where the notion of separate " industrial sectors " is in any case hardly appropriate. The authors round off this discussion with a brief reference to the relevance of their finding for the ideas on economic development deriving from the concept of balanced growth.

The authors do not inflate their claims for the utility of national income calculations ; and this is likely to enhance the acceptability of their concluding recommendations on the development of statistical services. Tanganyika may count itself particularly fortunate that its economic scene has been scrutinised by such keen-eyed and inquisitive observers as Professor Peacock and Mr. Dosser, and that it has the benefit of the advice of two economists who have not allowed any zeal for quantification and computation to get the better of their practical good sense.

B. S. YAMEY.

Demand for Automobiles in the United States. By G. C. CHOW. North-Holland Publishing Company, Amsterdam. 1957. xii + 110 pp. Fl. 10.

This study of demand for consumer durables uses regression analysis to find which economic theories of demand give good fits to statistics appropriate to the United States for the years 1921 to 1953, and thus including the war years. The consumer durable studied is the passenger motor vehicle. In any one year the new supply only constitutes about one quarter of the total stock so that, as a first approximation, the supply equation can be ignored. First, the study shows that the price of motor vehicles, including second-hand ones, can be ' explained ' very satisfactorily in terms of total stock and income. If income is defined realistically so as to allow for the value of services rendered by consumer durables purchased previously, there is no need to add a trend term to take care of changing tastes. This part of the study shows a price elasticity of about unity and income elasticity about 2. A second analysis considers consumer durables as alternatives to money, but not to interest-bearing securities which are affected by the rate of interest. Good fits are obtained when the price of cars is considered as a function of the stock of cars and the stock of money, and little improvement is obtained in the fit when income is added.

The third part of the study is more concerned to find the demand equations for new cars using stocks of old cars as one of the independent variables. At first glance the equations are now more difficult to interpret; the use of logarithms has been discarded so that the value of the calculated coefficients depends upon the units used for the variables. Values of these are of the order of 500 for income, 120 for price and only 7 for stock of cars and 2 for the purchase of cars; hence the coefficients linking income and price with the purchase of new cars seem small. The results are not such good fits as in the first and second types of analysis, and fits are better when disposable income rather than real consumption is used, purchases of new cars during a year being a function of price, disposable income and stock of cars at the beginning of the year.

H. S. BOOKER.

Quantity and Price Indexes in National Accounts. By RICHARD STONE. O.E.E.C., Paris. 1957. 120 pp. 10s.

This concise Report is intended to be a sequel to Professor Stone's *Standardised System of National Accounts*, also published by O.E.E.C., several years ago. While there are a number of connecting links between the two studies, the emphasis and manner of exposition are notably different. Professor Stone's aim here is to expound the application of Laspeyres' and Paasche's index-numbers over the framework of aggregated commodity transactions—a task that he accomplishes with polished restraint and imaginative dexterity.

Chapters I and II are mainly concerned to clear away possible misunderstandings as to what can and cannot be brought within the measuring rod he is wielding, given the present state of empirical knowledge. Chapter III develops the price/quantity dichotomy in various social accounting settings, and Chapter IV treads cautiously among the hazards of " measuring " or " indicating " quantitatively certain kinds of quality changes. Chapters V and VI deal respectively with problems of routing commodity flows and with the interesting difficulties connected with seasonal variation. The final chapters demonstrate the arbitrary nature of attempting to reduce an accounting system to a balance in constant prices, discuss the more general problems of choosing indicators, weights and a base-year, and list briefly the main types of index-number in use. There is a helpful Summary and some excellent advice on how to economise scarce statistical resources.

While the Report is for the most part written in a clear literary style, the level of exposition varies a great deal. Passages in which any student familiar with the elements of index-number and national income accounting should feel completely at home alternate in several sections of Chapters II—VI with highly technical excursions into matrix algebra and demand theory.

IAN G. STEWART.

The Analysis of Multiple Time Series. By M. H. QUENOUILLE. Charles Griffin & Co. Ltd. 1957. pp. 105. 24s.

This book is a research monograph which begins by investigating properties of various probability models that may be used for data consisting of several interdependent time series, and goes on to give an account of methods (mainly involving the analysis of serial covariances and correlations) for making statistical inferences from these models. It should be of value not only to the mathematical statistician wishing to acquaint himself with recent developments in multiple time series theory, but also to the applied statistician or econometrician who wants to use the methods for specific problems.

The main type of model considered is the multivariate linear autoregressive scheme with residuals which are moving averages of a series of independent disturbances. This gives an adequate representation of most series arising in practice which can be assumed stationary. Modifications to take account of non-stationary behaviour, such as the inclusion of a trend term, are discussed at some length.

The book is full of interesting theoretical points, many of which should act as a stimulus to further research, and at the same time maintains the close contact with statistical practice that characterises so much of Mr. Quenouille's work (five artificial series were specially constructed to provide numerical illustrations). The standard of the exposition is however a little disappointing, and gives the impression that the book was put together rather hastily. The reviewer found many of the arguments scrappy and obscure, and discovered a fair number of misprints—two of the most noticeable being on the top of p. 49 where " changes $\dot{x}(t)$ continuously " should read " changes x(t) discontinuously ", and on p. 84, line 11 where formula (4.4.4) is referred to but is not numbered in Chapter 4. It also seems unfortunate that in the practical example given in the final chapter, where the data consisted of U.S. hog, corn and wage series, the results of a fairly lengthy analysis were not particularly successful. This does, however, serve as a warning that the methods will not necessarily enable much progress to be made with problems in which theoretical considerations do not supply a well defined probability model.

A. M. WALKER.

Federal Lending and Loan Insurance. By R. J. SAULNIER, H. G. HALCROW and N. H. JACOBY. National Bureau of Economic Research. Princeton University Press. Oxford University Press. 1958. xxx + 566 pp. 96s.

To anyone still holding the ingenuous belief that the United States represents a system of undiluted, unrepentant *laissez-faire* government it will be something of a shock to discover that at the end of 1953 there were no fewer than 27 Federal agencies actively engaged in the provision of credit in collaboration or competition with (or through the default of) private financial institutions. Not surprisingly, the authors of the present work suggest that this massive network of Federal agencies dispensing credit to the private sector " constitute what is in fact a second financial system ". To analyse its significance they found themselves investigating nearly 150 separate credit programmes administered in the United States between 1917 and 1953; at the end of the latter year the loans, guarantees and stock purchases outstanding against such programmes amounted to the very respectable sum of $43 billion. (And all this even after excluding Federal loans to foreign governments or international institutions and loan programmes on the part of State and local governments !) The end-product of the authors' labours is a magnificent, tremendously impressive piece of research which will surely be a standard work on this aspect of the American economy for very many years to come.

The broad record of this vast incursion by the U.S. Government into the business of credit provision is a somewhat patchy one. As a counter-cyclical weapon it has resembled the Sten gun, from which, in my recollection, missiles were apt to emerge in unpredictable numbers and diverse directions. From the point of view of paying its way, the record has been reasonably satisfactory for agriculture and housing but definitely chastening for industry. (An important finding of the study is that the unprofitability of government lending to industry was *not* due to a special favouring of small firms. Nevertheless striking evidence is provided of the familiar fact of industrial finance—that loans below a certain level simply cannot pay their way. It is calculated (pp. 512–3) that the Reconstruction Finance Corporation lost nearly $6,000 every time it made a loan of $1,000—although the estimate rests on an assumption concerning acquisition and service costs which is clearly open to objection. Hence the rueful remark of one R.F.C. director, *a propos* loans of this size, " I am sure we would be better off if we just wrote them a check and called it a day ".) Even from the point of view of the borrowers themselves the Federal credit programmes do not appear to have always been unmixed blessings. For example, it is suggested (p. 143) that, given the inelasticity of demand for farm products, the increased output stimulated by Federal agricultural credit in the 1930's actually resulted in a fall in the share of the national product going to farmers; again, it is argued (pp. 144 and 345) that a major effect of Federal housing credit in the post-war years has been an undue rise in the construction costs of houses. Another interesting and unexpected finding is that the Federal credit programmes have catered primarily for the medium-sized businesses, farms and houses; they have served the small man to an even lesser degree than the comparable private financial institutions. Taken all in all, the authors conclude that, while the impact of the Federal programmes has been considerable for particular sectors and groups at particular times, their overall influence has not been as great as might have been expected. Perhaps their greatest contribution has lain in their effect on the practices and policies of private credit agencies operating in the various sectors involved.

All this the authors discuss with great care and detail, achieving an unusual combination of scholarly objectivity and attractive style (except for a twice-used grammatical construction on p. 104 which is awful to behold). If there has to be criticism, it can only be directed to the very imperfect degree of integration between the individual contributions of each of the three authors. The way in which they have divided the task amongst themselves is painfully obvious, and it has given the book a rather tiresome and repetitious structure; the attempts to synthesise the experience in the three fields of agriculture, business and housing are little more than nominal and certainly unconvincing.

EDWARD NEVIN.

Estate Capital: the Contribution of Landownership to Agricultural Finance. By D. R. DENMAN. Allen & Unwin. 1958. 218 pp. 22s. 6d.

This book is based on the results of four surveys of agricultural estates which have been carried out, with the assistance of American "conditional aid" funds, by the Department of Estate Management at Cambridge University. The surveys covered altogether about 5½ million acres of land, but most of the information given relates to a selected sub-sample covering about 1½ million acres.

As his title implies, Dr. Denman is mainly interested in the provision of capital for estate purposes, and the adequacy of estate incomes to finance improvements is the theme of his central chapters. Further chapters analyse the motives which induce landlords to retain ownership of estates and spend money on improvements, and those which in other cases restrain them from such expenditure or from seeking to enlarge their rental revenues. Other subjects dealt with include the influence of estate duty and tax rebates and the special position of charity estates.

The legal and institutional framework in which agricultural estates are obliged to operate is a matter of considerable public importance, and Dr. Denman's book is to be welcomed as an attempt to throw some light on an obscure subject. His findings make up a picture of which it is in many ways difficult to make economic sense. The habit of running agricultural estates as a rich gentleman's pastime evidently still persists, but alongside the old-fashioned motives responsible for it we now have to reckon with the oddities of the taxation system and the effects of legal control of tenure and of the law relating to rent arbitration.

The book suffers, however, from certain weaknesses. Among them are the author's fondness for obscure terminology and a reluctance to present facts directly which at times make both his text and his tables difficult to follow. It appears for example that half the tenanted estates in his sub-sample have no net income. But this fact is not directly stated: it has to be inferred from a table which classifies the estates according to the degree of their "competence" to meet their average improvement expenditure out of their incomes. It dawns on the reader, as he ponders the meaning of this classification, that total "incompetence" must imply a zero or negative income; but he has to wait for two chapters before Dr. Denman's own words confirm his inference.

It might be supposed that the level of actual improvement expenditure on different estates would bear some relation to the degree of their competence in Dr. Denman's sense. It is shown, however, that the wholly incompetent estates, which must have relied on external funds for the whole of their improvement expenditure, actually spent substantially more on improvements than the partially or wholly competent ones. Improvement expenditure, of course, yields some return in increased income, but its amount is not estimated. A substantial minority even among the partially or wholly incompetent estates seem to make some improvements for which no interest payment is asked for.

The major shortcoming of the book is that it is planned as a discussion of the particular topics the author happens to be interested in, illustrated by selected figures drawn from the surveys, and does not attempt a systematic report on them or a full tabulation of their results. But the surveys must have yielded a great deal of valuable information bearing on the economics of landownership under contemporary conditions, and those who wish to study this subject will regret that Dr. Denman has not put more of it into his book.

E. F. NASH.

SHORTER NOTICES

Labor in a Growing Economy. By MELVIN W. REDER. John Wiley & Sons Inc., New York. Chapman & Hall Ltd. 1957. xii + 534 pp. 52s.

This text-book of the economics of labour deserves special note because of its effective combination of analysis with information. Each issue is treated in its actual setting, with due regard to the social and political factors that operate there, but economic analysis is applied skilfully to the task of explaining what happens. The discussion of each question is guided by a survey of the available evidence, the references to which form an extensive bibliography. The treatment throughout combines keenness in conjecture with a careful regard to fact. Readers will also find this book useful for its comprehensive account of the world of American trade unionism, labour law, and industrial relations.

Wage Incentives as a Managerial Tool. By WILLIAM B. WOLF. Columbia University Press. Oxford University Press. 1957. x + 143 pp. 28s.

This survey of the problems that wage incentives raise for management is noteworthy for its care in setting out the costs and upsets that occur in practice when these incentives are applied—such as pressure to extend higher rates of earning to other jobs, disputes about rates, ceilings on output, and jealousies among workers. A chapter on the theory and logic of wage incentives examines the assumptions on which alone the desired outcome will follow, and points out many circumstances in which they will not hold. The conclusion of a pertinacious and salutary argument is that wage incentives have potentialities for harm as well as good, because they depend on standards of performance that cannot be established objectively, accentuate conflicts between the goals of management and workers, and distort wage structures.

Motivation Research: Its Practice and Uses for Advertising, Marketing and Other Business Purposes. By HARRY HENRY. Crosby Lockwood. 1958. 240 pp. 30s.

Motivation Research and Marketing Management. By JOSEPH W. NEWMAN. Harvard University, Graduate School of Business Administration, Boston. Bailey Bros. & Swinfen Ltd. 1957. xiv + 525 pp. $7.50. 60s.

These two books may be considered as complementary to each other. Both are largely designed for the information of business men; but whereas Mr. Henry goes straight through the description of the functions of motivation research, its basic techniques and its main fields of application, Professor Newman attempts the more general exposition of the uses of what he calls " the behavioral sciences " in marketing and sets out in great detail six case examples. Mr. Henry, who describes the aims of his book as " vulgarly commercial rather than scholarly ", firmly puts motivation research in its place as an extension of standard consumer research, and succeeds in being witty as well as informative. His nearest approach to a definition of motivation research is " the study of the relationship between the personality of the consumer and the personality of the product " which, as he indicates, is admirably clear to anybody who knows what it is already. What matters is his description of how he envisages the techniques in action. Professor Newman's book necessarily aspires to be scholarly as well as to serve commercial aims. It is more likely to survive as a work of reference than as a readable introduction to a still amorphous subject.

Hire Purchase in a Free Society. Edited by RALPH HARRIS and ARTHUR SELDON. Institute of Economic Affairs. 1958. 88 pp. 7s. 6d.

This survey of the present structure and finance of hire purchase debt in the U.K. is particularly useful in view of the controversy on the degree of responsibility for price level changes which should be pinned on to credit creation outside the banking system. The editors of this book are firmly of the opinion that hire purchase is not " a serious, independent inflationary element in the economy " and, although the arguments which lead to this conclusion are not wholly convincing, they are supported by an assembly of facts and figures in themselves of considerable value.

The Social Aspects of Prescribing. By J. P. MARTIN. William Heinemann Ltd. 1957. xii + 180 pp. 21s.

In a situation where the price system does not operate, as in the provision of medicines and drugs for National Health Service patients, methods of control have to be devised for keeping the cost of pharmaceuticals under check. Much of the evidence of " excessive " prescribing as a means of attracting practice by doctors has been of an impressionistic character, and Mr. Martin has performed the useful task of analysing the variations in prescribing according to area, frequency of prescription per patient, and average cost of prescription. Two interesting conclusions of the study are that, contrary to other evidence of a more limited character, differences in age structure affected the average frequency of prescription per patient very little, and that the prescription cost per former panel patient in many areas is less than for former private patients.

The volume provides a very handy historical introduction to prescribing and full details both of the statistical methods used and of tabulated results.

Underdeveloped Areas. Edited by LYLE W. SHANNON. Harper, New York. 1957. 496 pp. $6·50.

This is a volume of " inter-disciplinary " readings compiled and edited by a sociologist. Economics and related subjects such as demography and technical assistance take up about half the book. Given the sociological slant of the editor, the articles in these sections are well chosen and cover various aspects of the economic development of the underdeveloped countries. However, to the economist working in this field, the more interesting sections are those dealing with non-economic or purely sociological topics culled from various professional journals which he would not normally come across. Like an interesting bran-tub, these range from colonial universities to mass media and communication techniques; and from cultural barriers against technical assistance to planned parenthood. In general, the selection of materials for the book has benefited from the editor's fondness for a statistical approach, but this seems to have been carried a little too far in the final chapter of the book when the editor and another contributor attempt to derive an " objective" measurement of " fitness for self-government " !

Middle Eastern Economic Relations with the Soviet Union, Eastern Europe and Mainland China. By ROBERT LORING ALLEN. University of Virginia. 1958. 128 pp. $1.

Professor Allen has provided as useful a summary of Soviet bloc trade with the Middle East as could have been wanted. The available evidence is neatly summarised and the comments are sane and objective. The author, being neither a Soviet plot-monger nor an " errors-of-the-West " spotter, has concentrated on the economic motivation behind the recent substantial expansion of trade with the Middle East, while not omitting the political factors on both sides. Three most valuable appendices give annual statistics of Soviet bloc trade by countries with the individual states of the area, summarise what is known of the bilateral trade and payments agreements between these states and Soviet bloc countries, and list offers and extensions of credit and technical assistance made by the latter to the former.

Economic and Technical Problems of Australia's Rural Industries. By D. B. WILLIAMS. Melbourne University Press. Cambridge University Press. 1957. xii + 146 pp. 27s. 6d.

The prosperity of the whole Australian economy is still ultimately dependent on the prosperity of the rural sector. This recent survey of that sector deals with its economic and technical problems, and the policies—so largely haphazard, hurried and inconsistent—which have attempted to solve them. The author shows first the fundamental role played by the assumption of continued agricultural prosperity in most of Australia's post-war policies—of full employment, of immigration, of industrialisation— and the burden placed on her primary industries, selling in a competitive world market, when these policies have become too ambitious. The main problems dealt with are those of prices and marketing, land tenure, capital and credit, and the provision of scientific and technical assistance.

Immigration to Israel 1948-1953. By MOSHE SICRON. Falk Project for Economic Research in Israel, Jerusalem. 1957. xix + 137 pp. $2.

A statistical supplement to this volume, consisting of basic statistical tables, is to be issued shortly. This volume itself contains summary tables and derived statistics, and a textual commentary. Some of the data have not appeared previously, others have been collected from a wide range of published sources. The treatment is competent and, having access to official information, the author points out inherent faults in the data in a properly frank manner.

The study concentrates on a comparison of migration under the mandate (in this sense the title is misleading) and since the State of Israel was set up, and of migration from various sources, e.g. Asia and Europe. Early chapters deal with the volume of migration and later chapters with the structure as regards age, sex, marital condition, family composition and economic characteristics.

In its own peculiar field, this study makes a valuable contribution to knowledge.

Les marchés des matières premières. By J. GOTTMANN. Armand Colin, Paris. 1957. 435 pp.

The author is a French geographer with a distinguished record of research both at home and in the U.S.A. His book is not an economic geography. Limited attention is given to the region and the physical forces influencing production. The units of study are essentially nations and commodities, and a meticulous survey of production, consumption and trade in raw materials is provided. The work has many special merits, notably its detailed account of restriction and price support schemes and its cautious treatment of statistics of mineral resources. It might be useful as a reference work to economists and geographers, but it is unfortunate that there are no maps or diagrams and no index.

Die Wirtschaftsverbände in der Marktwirtschaft. By JOSUA WERNER. Polygraphischer Verlag AG, Zürich and St. Gall. 1957. xii + 231 pp.

Dr. Werner's book deals with the behaviour and development of industrial organisations in the most general sense of this word. The field it covers includes cartels, trade unions and professional organisations. The first half of the book is descriptive. It gives us an outline of the development of these organisations and a brief discussion of their principal characteristics (with special reference to Switzerland and the United States). The other half is analytical and deals with a variety of subjects in the theory of prices and distribution. The treatment is in the nature of a survey of what has been done so far by other writers in this field. It does not throw any new light on the subject.

The Measurement and Behavior of Unemployment. NATIONAL BUREAU OF ECONOMIC RESEARCH. Special Conference Series. Princeton University Press. Oxford University Press. 1957. x + 605 pp. 60s.

This report of a conference held at Princeton in 1954 comprises a very convenient summary of various concepts and measurements of employment and unemployment. There is a short introduction by Clarence D. Long and the eleven papers included are by official and academic experts in the United States. Five of the papers are on concepts and on the extent to which they can be measured from available data in the United States. There is a further group of four papers on various aspects of unemployment in the United States since 1900 and particularly in the post-war years, together with a useful paper on the statistical material relating to the Soviet labour force. The last contribution, and by far the longest, is concerned with an international comparison of unemployment rates. This sets out the figures available over the past 50 years or more in ten of the industrial countries of Europe and the Commonwealth. It provides good examples of how differences in concept and definition can make international comparisons so difficult.

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